

# Diagnostic accuracy of Trucut Needle Biopsy and Fine Needle Aspiration Cytology as Compared with Final Histopathological Examination to Diagnose Breast Lump as Malignant or Benign

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**Abstract:** Objective: To find out the diagnostic accuracy of Fine Needle Aspiration Cytology (FNAC) and Trucut Needle Biopsy (TCNB) against final histopathological examination in breast lumps suspicious for malignancy. Methodology: Retrospective cross sectional observational study for a duration of 2 years in the department of pathology Pt. JNM Medical College Raipur and associated Dr. BRAM Hospital Raipur (C.G.). Female patients presented with suspected malignant breast lumps were included in the study. All breast lumpectomy cases were studied and patient's previous FNAC and TCNB report obtained and their results were analyzed and re-categorized as C1,C2,C3,C4 and C5 for FNAC; B1,B2,B3,B4 and B5 for TCNB. Results: Total 110 cases of suspected malignant breast lump were taken in the study. Malignant cases were found to be maximum 39.6% in age group between 41 to 50 years while benign cases were maximum 40% among age group 31 to 40 years. In this study sensitivity, specificity, positive predictive value and negative predictive value for FNAC were 71.3%, 100%, 100% and 43.9% respectively while for TCNB were 97.4%, 100%, 100% and 91.3% respectively. Both FNAC and TCNB were found 100% specific in diagnosing malignant breast lesions and both procedure having similar positive predictive value of 100%. Conclusion: TCNB is more sensitive than FNAC in diagnosing malignant breast lumps. Both the procedures having 100% specificity. False negativity rate is more in FNAC.

**Keywords:** TCNB, FNAC, malignant breast lump

## 1. Introduction

Breast cancer is the most common cancer in women worldwide and it is the leading cause of cancer death for women between ages 20 to 59 years. Breast cancer causes 519000 deaths per year worldwide, and about 900000 women are newly diagnosed as cancer breast every year. Breast cancer incidence is 0.26/100000 in males and 20.01/100000 in females. Mortality rates due to cancer breast have increased during the past sixty years in all countries.<sup>[1]</sup>

Accurate diagnosis of cancer has been a diagnostic dilemma since long. It is very essential to diagnose it at an early stage as benign or malignant to avoid unnecessary extensive breast excision and delay in the treatment.<sup>[2]</sup>

Various diagnostic methods have been developed to evaluate the breast lumps with the goal of identifying a sensitive, specific, efficient and economical approach to diagnose breast cancer. Physical examination, mammography, trucut needle biopsy (TCNB or Core needle biopsy), ultra sonography, thermography, fine needle aspiration cytology (FNAC), open excision biopsy are all used to greater or lesser extent in diagnostic workup of a palpable breast mass. Various combinations of these approaches have been studied

and have been found to increase the specificity and sensitivity over that of any one test alone.<sup>[3]</sup>

Both FNAC and TCNB have been used as an important diagnostic method for breast lumps with some advantages and disadvantages of one method over another. Our institute is a tertiary care referral hospital catering a huge number of patients from peripheral areas as well and breast malignancies make a significant number of these cases. FNAC and excision biopsies are being performed in our institute since long. However TCNB have been introduced only few years back and being performed regularly here. This study was undertaken to compare the diagnostic accuracy of TCNB and FNAC in our setup.

## 2. Aims and Objectives

- 1) To find out the diagnostic accuracy of fine needle aspiration cytology (FNAC) and trucut needle biopsy (TCNB) against the gold standard method final histopathological examination in breast lesion suspicious for malignancy.
- 2) To find out the sensitivity and specificity of TCNB and FNAC diagnostic tests.
- 3) To compare diagnostic accuracy of FNAC and Trucut needle biopsy in differentiating the benign and malignant lesions of palpable breast lumps.

### 3. Materials and Method

The present study was a retrospective cross sectional observational study conducted at department of pathology Pt. Jawaharlal Nehru Memorial Medical College Raipur (C.G.) for the period of 2 years (1st August 2016 to 31<sup>st</sup> July 2018) duration done in 110 female patients presented with suspected malignant breast lump in our hospital and MRM or lumpectomy specimen were sent to the pathology department were included in the study. The study was performed after obtaining the approval from ethical committee.

**Exclusion criteria-** Inflammatory lesion, fibrocystic disease, male patient, final lumpectomy or MRM specimen not received, previous FNA and trucut biopsy report not available, patients had received chemotherapy, radiotherapy, or hormone therapy between CNB and surgical excision.

**Method:** Clinical data and materials were retrieved from patients having palpable breast lumps with suspicious malignant features on mammogram or clinically. All breast lumpectomy cases received in the department of pathology were studied and patient's previous FNA and TCNB report obtained. Final results of FNAC and TCNB were collected, reviewed and categorized according to National Health Service Breast Screening Programme (NHSBSP) as C1, C2, C3, C4 and C5 for FNAC results and B1, B2, B3, B4 and B5 for TCNB (Table 1)

**Table 1:** Reporting Categories for FNAC and Trucut Needle Biopsy according to NHSBSP<sup>[4]</sup>

| Cytology (FNAC) reporting          | TCNB biopsy reporting                                  |
|------------------------------------|--|
| <b>C1</b> Unsatisfactory           | <b>B1</b> Unsatisfactory/Normal tissue only            |
| <b>C2</b> Benign                   | <b>B2</b> Benign                                       |
| <b>C3</b> Atypia probably benign   | <b>B3</b> Benign, but of uncertain malignant Potential |
| <b>C4</b> Suspicious of malignancy | <b>B4</b> Suspicious of malignancy                     |
| <b>C5</b> Malignant                | <b>B5</b> Malignant                                    |

### 4. Results

Total 110 cases of suspected malignant breast lump were included in the study. Out of them 24 (21.82%) cases were diagnosed as benign lesions while 86 (78.18%) cases were diagnosed as malignant lesions on final histopathological examination. Malignant cases were found to be maximum (39.6%) in age group between 41 to 50 years while benign cases were maximum (40%) among age group 31 to 40 years.

**Table 2:** Histopathological spectrum of breast lesions

| Diagnosis                                  | No of Cases | Percentage |
|--|-------------|------------|
| Invasive Ductal Carcinoma (IDC)            | 80          | 72.7%      |
| Fibro adenoma                              | 13          | 11.8%      |
| Benign Proliferative Breast Disease (BPBD) | 8           | 7.3%       |
| Invasive Lobular Carcinoma (ILC)           | 3           | 2.7%       |
| Ductal Carcinoma In Situ (DCIS)            | 2           | 1.8%       |
| Benign Phylloides Tumor                    | 2           | 1.8%       |
| Fibrocystic Diseases                       | 1           | 0.9%       |
| Malignant phylloides tumor (MPT)           | 1           | 0.9%       |
| Total                                      | 110         | 100%       |

**Table 2** shows Histopathological spectrum of breast lesions. Most of the cases 80 (72.7%) were diagnosed as Invasive ductal carcinoma followed by Fibroadenoma 13 cases (11.8%). Upper outer quadrant was most common location for both malignant (42%) and benign lesions (62%). Most malignant tumors 44 cases (51.16%) were having size between 2 to 5 cm followed by 6 to 10 cm in 36(41.87%) cases. No malignant lesions were found more than 10 cm of size. The size of benign tumors in most of the cases 13 cases (54.2%) were less than 2 cm.

**Table 3:** Distribution of patients with their cytological category and TCNB category as assessed by NHSBSP

| TCNB Results | FNAC results  |               |             |               |               | Total         |
|--------------|---------------|---------------|-------------|---------------|---------------|---------------|
|              | C1            | C2            | C3          | C4            | C5            |               |
| B1           | 2<br>(1.8%)   | 1<br>(0.9%)   | 0           | 8<br>(7.2%)   | 2<br>(1.8%)   | 13<br>(11.8%) |
| B2           | 5<br>(4.5%)   | 14<br>(12.7%) | 0           | 0             | 0             | 19<br>(17.3%) |
| B3           | 0             | 1<br>(0.9%)   | 2<br>(1.8%) | 0             | 0             | 3<br>(2.7%)   |
| B4           | 1<br>(0.9%)   | 0             | 0           | 0             | 0             | 1<br>(0.9%)   |
| B5           | 4<br>(3.6%)   | 0             | 1<br>(0.9%) | 14<br>(12.8%) | 55<br>(50%)   | 74<br>(67.3%) |
| Total        | 12<br>(10.9%) | 16<br>(14.5%) | 3<br>(2.7%) | 22<br>(20%)   | 57<br>(51.8%) | 110<br>(100%) |

**Table 3** show category of patient according to NHSBSP for FNAC and TCNB. Out of total 110 cases 14 cases (12.7%) were diagnosed as benign by both procedures. 1 case diagnosed as giant fibroadenoma in cytology and put under C2 category which was diagnosed as benign phylloides in TCNB and kept in B3 category. One case of malignant phylloides was categorized under C3 in FNAC and B5 in TCNB. On FNAC 14.5% cases were diagnosed as benign lesion C2 while 19 (17.3%) cases were diagnosed as B2 on TCNB, hence benign lesions also had higher detection rate by TCNB as compared with FNAC. 55 malignant cases were diagnosed as C5 and B5 and shown to be true positive in both the procedures.

Out of 110 cases total 74.9(67.3%) cases were diagnosed as B5 in TCNB while 57(51.8%) cases were diagnosed as C5 in FNAC, so TCNB has 14.6% more chance to diagnose malignant lesion than FNAC.

Out of total 12 inadequate cases of FNAC, 2 cases were inadequate for TCNB, 5 cases were diagnosed as benign (B2), 1 case was found suspicious for malignancy and fell under B4 category and 4 inadequate cases were diagnosed as malignant B5 in TCNB. 1 case diagnosed as benign (C2) falls inadequate (B1) in TCNB

**Table 4:** Accuracy of TCNB and FNAC in the value of sensitivity, specificity, positive predictive value and negative predictive value

|      | Sensitivity | Specificity | Positive Predictive Value | Negative Predictive Value |
|------|-------------|-------------|---------------------------|---------------------------|
| FNAC | 71.3%       | 100%        | 100%                      | 43.9%                     |
| TCNB | 97.4%       | 100%        | 100%                      | 91.3%                     |

**Table 4** shows sensitivity, specificity, positive predictive value and negative predictive value of FNAC and TCNB. In this study sensitivity, specificity, positive predictive value and negative predictive value for FNAC were 71.3%, 100%, 100%, 43.9% respectively while for TCNB 97.4%, 100%, 100% and 91.3% respectively. FNAC was found less sensitive diagnostic test than TCNB for malignant breast lesions. Both FNAC and TCNB were found 100% specific in diagnosing malignant breast lesions and both procedure having similar positive predictive value of 100%. Significant difference was found in negative predictive value of FNAC 43.9% and TCNB (91.3%).

## 5. Discussion

Histopathology is considered to be the gold standard for diagnosis of breast lump. Emphasis has been placed now a days on improving method for establishing a definite diagnosis of breast mass prior to surgery. Several studies have been conducted to compare the role of FNAC & TCNB in the diagnosis of breast carcinoma considering the histological diagnosis from excised specimen being gold standard.

Total 110 cases were included in present study and 78.18% cases were found to be malignant lesion while 21.82% lesions were diagnosed as benign. Incidence of breast cancer is seen to increase with advancing age of the patient. Peak incidence is 4<sup>th</sup> to 5<sup>th</sup> decade of life. 65.2% seen among age group between 41- 60 years and mean age of malignancy is 47 years in our study. Similar findings were seen with the study done by **Sen and Das Gupta et al**<sup>[5]</sup>, 63.4% malignant cases in the age group 41 to 60 years and **Subangi K G et al**<sup>[6]</sup> reported 54.5% cases for the same age group. **Azitha M B et al**<sup>[7]</sup> shown that maximum incidence of breast lump seen in 3<sup>rd</sup> decade and 5<sup>th</sup> decade while **Ganesh Gojanur et al**<sup>[8]</sup> shown 41-50 year was the commonest age group for malignant breast lesions.

In our study benign breast lumps were found in the age ranged between 25 to 59 years and most of the benign lesions 41.7% were found in the age group 30 to 40 years which were similar **Sen and Das Gupta et al**<sup>[5]</sup>, **Subangi K G et al**<sup>[6]</sup> and **Azitha M B et al**<sup>[7]</sup>. Mean age for benign tumors was 30 years in our study which was comparable with the study done by **Ganesh Gojanur et al**<sup>[8]</sup>, they noticed 32 years as mean age.

Size of malignant cases were between 3-5 cm in 51.25% and between 6-10 cm in 41.25 % cases in the present study.. **S Sujith Kumar et al**<sup>[9]</sup> noted similar results in their study. **Subangi K G** reported maximum malignant cases having size between 6-10 cm.

In our study maximum breast lump 46.3% were present in upper outer quadrant ,60 % for benign and 42.4% malignant lesion . Same kind of finding is shown by **Subangi et al** i.e.52.5% in upper outer quadrant. This is also comparable with the study done by **Sen and Das Gupta series** 49%

Infiltrating ductal carcinoma ( IDC) was the most common (94.2%) malignant lesion which was similar to the study done by **Rosenet et al**<sup>[10]</sup> 75% and **Dr. Subhangi et al** 72%. This may be due to difference in sample size and geo-ethenic differences in the study population.

**Inadequacy rate** in our study was 10.9% for FNAC and 11.8 % for the TCNB. It was slightly higher than the study done by **Muzzamil Mushtaque et al**<sup>[11]</sup> is 3.63% and 7.27%, **Shannon J et al**<sup>[13]</sup> 2.5% and 5%, **Poon and Kocjan**<sup>[13]</sup> 1.4% and 2.3% respectively for FNAC and TCNB. Major problem in the diagnosis of breast lump by FNAC and TCNB was inadequacy . In FNAC problem is due to bloody aspiration, sclerosis, vague lump, deep seated lesion, technical error or faulty method. Inadequacy in TNBC was mostly due to biopsy was not taken from proper area or not performed by experienced surgical hands. Inadequacy is the reason for delayed treatment and morbidity.

**Table 5:** Comparison of sensitivity, specificity, positive predictive value and negative predictive value for FNAC & TCNB with various studies

| S.n | Authors  | Total | Test         | Sensitivity    | Specificity  | Ppv          | Npv            |
|-----|--|-------|--------------|----------------|--------------|--------------|----------------|
| 1   | <b>Ganesh Gojanur et al</b> <sup>[8]</sup> 2017  | 30    | FNAC<br>TCNB | 76.8%<br>90%   | 100%<br>100% | 100%<br>100% | 52%<br>83%     |
| 2   | <b>Abhijit Saha et al</b> <sup>[14]</sup> 2016   | 50    | FNAC<br>TCNB | 69%<br>88.3%   | 100%<br>100% | 100%<br>100% | 38%<br>53%     |
| 3   | <b>Shashirekha C. et al</b> <sup>[15]</sup> 2017 | 62    | FNAC<br>TCNB | 84.3%<br>97.1% | 100%<br>100% | 100%<br>100% | 90%<br>95%     |
| 4   | <b>Present Study</b> 2018                        | 110   | FNAC<br>TCNB | 71.3%<br>97.4% | 100%<br>100% | 100%<br>100% | 43.9%<br>91.3% |

**Table 5** shows comparison of sensitivity, specificity, positive predictive value and negative predictive value with different study. We found that the diagnostic accuracy of TCNB was higher than the FNAC which was statistically significant .This study shows that both diagnostic procedures have same specificity (100%) while TCNB is more sensitive (97.4%) than FNAC (71.3%) in diagnosing malignant lesions of breast. However negative predictive value of FNAC was found to be significantly lower (43.9%) than TCNB (91.3%).

## 6. Conclusion

TCNB is found to be more sensitive and accurate with higher negative predictive value than FNAC in our study. FNAC is more convenient, safe , rapid and cheap diagnostic procedure as compared with TCNB and it matters in developing countries. So if the initial FNAC is inadequate, TCNB can be a useful as second line method of pathological diagnosis in order to minimize the chance of missed diagnosis of breast cancer . One should be mindful of the limitations of each technique and the choice between fine

needle aspiration and core biopsy should be individualized for the patient. The choice of diagnostic test should be determined by patient's economic status, preference of managing surgeon, need for biomarker studies, availability of equipment and expertise, clinical and radiological indications.

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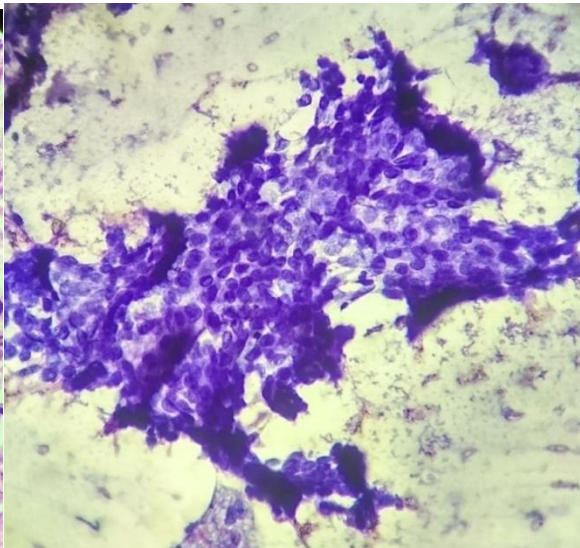
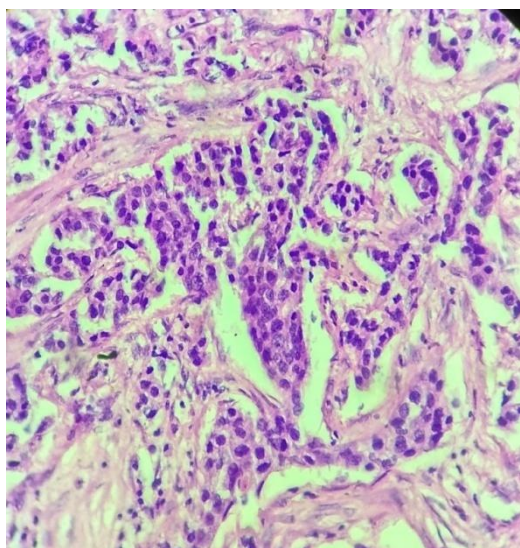
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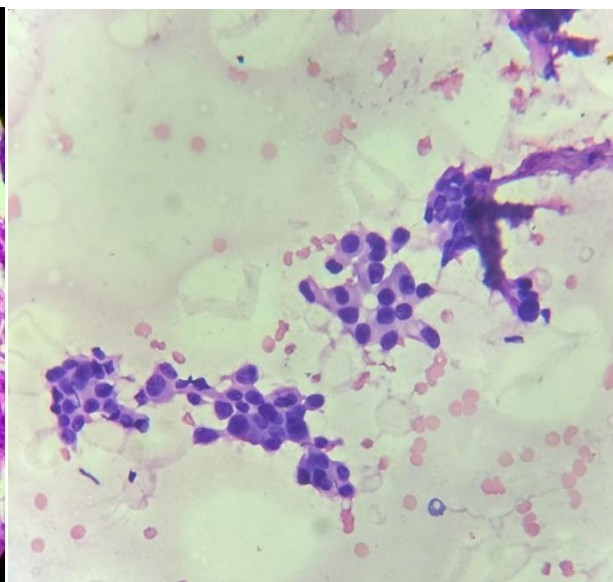
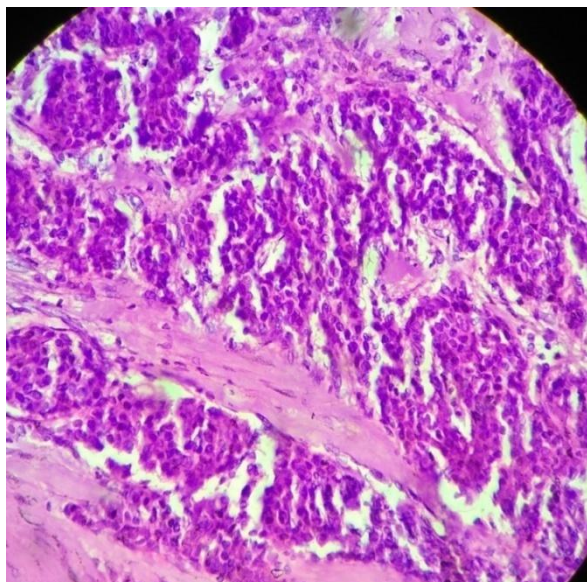
**Conflict of interest:** None declared

**Ethical approval:** The study was approved by the institutional ethics committee

## 8. Photomicrographs



Photomicrograph A and B showing feature of IDC breast on TCNB and FNAC respectively



Photomicrograph C and D showing features of invasive lobular carcinoma in TCNB and FNAC respectively

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