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Comparison of trucut biopsy and postoperative specimens histopathological diagnosis of palpable breast lesions

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Abstract
Background: A palpable breast lump is a common clinical problem that presents to OPD. Many diagnostic modalities are available for the evaluation of breast lumps. For several years, fine needle aspiration cytology (FNAC) was the most practiced method for pathological diagnosis. However, the introduction of Trucut biopsy has resulted in many surgeons switching to Trucut biopsy since it provides enough tissue for pathologists to make an accurate diagnosis. Thus, Trucut biopsy is an important investigation for palpable breast lesions and helps in deciding subsequent treatment.
Aims and Objectives: This research aimed to define the reliability of histopathological diagnosis of Trucut biopsy and subsequent excision biopsy of palpable breast lesions.
Materials and Methods: This is a retrospective study of the breast specimens received over a period of 1 year from January 2023 to December 2023 in the histopathology division of our tertiary care hospital.
Statistical analysis: Sensitivity, Specificity, Positive Predictive Value, Negative Predictive Value, and Diagnostic Accuracy were found.
Results: Out of 46 patients of trucut biopsy histopathological diagnosis showed 14 cases (30.45%) to be benign lesions, and 32 (69.55%) as malignant lesions. There were 2 discordant and 44 concordant cases. Sensitivity, Specificity, Positive predictive value, Negative Predictive Value, and Accuracy were 94.1%, 100%, 100%, 85.7% and 95.7% respectively.
Conclusion: Thus, trucut biopsy should be considered as a first line of tissue diagnosis in a patient with a breast lump before definitive treatments.

Keywords: Benign, breast, excision, histopathology, malignant, trucut biopsy

Introduction

The breast is a highly modified apocrine sweat gland, composed of both epithelial and connective tissue components. The range of breast diseases varies from inflammatory to neoplastic (Benign or malignant). Diseases of the breast account for a significant proportion of medical workload globally making the breast the most commonly biopsied tissue currently [1]. Preoperative diagnosis of breast lesions is important to decide subsequent management [2]. A palpable breast lump is a common clinical problem that presents to OPD which makes it significant to distinguish between benign and malignant conditions before treating it. Multidisciplinary approach - The triple assessment test is the gold standard for breast lump which includes clinical examination, radiological imaging, and pathological examination [3]. In pathological examination, Core needle biopsy (CNB) is of great value both in nonpalpable and palpable lesions of the breast than fine needle aspiration cytology (FNAC). Moreover, additional molecular and immunohistochemical tests can more accurately and conveniently be done on CNB in comparison to FNAC [4]. Every procedure has its benefits and drawbacks. However, the excision biopsy is considered the gold standard for diagnosis [5].
Consequently, trucut biopsy is considered a better diagnostic test, but it has certain limitations especially in under and over-reporting of malignant tumors. Hence our study aims to define the further reliability and diagnostic accuracy of trucut biopsy diagnosis as compared to postoperative histopathological diagnosis of palpable breast lesions [5].
We are reporting a histopathological comparison of 46 cases of trucut biopsy with subsequent postoperative specimens.

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Materials and Methods

This is a retrospective study of the breast specimens received over a period of 1 year from January 2023 to December 2023 in the histopathology division of our tertiary care hospital which was ethically approved by the institutional committee.

After preliminary clinical workup, patients with palpable breast lumps underwent trucut biopsies which were sent to the histopathology department. These biopsies were assessed, and a histological diagnosis was obtained. Later, these patients underwent surgical procedures like mastectomy, excision biopsy, or wide local excision of the same lesion, and histological diagnosis was obtained. Breast specimens were received in 10% buffered formalin, auto-processed. Paraffin-embedded sections (at 2–3 μm) were routinely stained with haematoxylin and eosin stains.

Data were extracted from the departmental registers, patient request forms, duplicate copies of histology reports of all cases, and case notes/files of patients. Information extracted includes age, side of breast affected, type of biopsy done, and histology diagnosis.

The tumors were classified using the 5th edition WHO International Classification of Breast Tumors and graded using Nottingham modification of the Bloom and Richardson grading system. Data were analyzed using predictive analytical software, version 29 (IBM, SPSS Inc., Chicago, IL, USA).

We reviewed the histopathological reports from records and compared the trucut biopsy diagnoses with the subsequent excision/excision biopsy of the same lesion and the concordance and discordance are obtained between trucut biopsy and excision biopsy.

Inclusion criteria
1. Trucut biopsy, incision biopsy, excisional biopsy, and mastectomy specimens were included in this study.
2. Female patients of pubertal, reproductive, and postmenopausal age groups were included in this study.

Exclusion criteria
1. Females of the prepubertal age group were excluded from the study.
2. Women who have been already diagnosed or treated for breast malignancy were excluded from this study.

Results

Forty-six (46) patients were included in this study. The histopathological diagnosis of initial trucut biopsy showed 14 cases (30.45%) to be benign lesions, and 32 (69.55%) as malignant lesions. A consequential excision surgical procedure was done according to management protocol, based on this final histopathological diagnosis there were 12 cases (26.09%) to were benign lesions and 34 (73.91%) as malignant lesions.

Table 1 is a statistical representation of benign and malignant case results of trucut biopsy. Out of 14 (30.45%) benign cases, fibroadenoma was 06(13.06%) cases, benign phyllodes were 05(10.88%) cases, and in others each case of clear cell metaplasia, atypical ductal hyperplasia, and chronic mastitis with 2.17% respectively. Out of 32(69.55%) malignant cases, 23(50.0%) cases were invasive ductal carcinoma, 03(6.52%) cases were ductal carcinoma in situ, 02(4.35%) cases were suspicious for malignancy and other malignant cases include each case of invasive lobular carcinoma, medullary carcinoma, neuroendocrine tumor of

breast and anaplastic undifferentiated carcinoma with 2.17% respectively.

Table 2 is a statistical representation of benign and malignant cases results of postoperative specimen histopathological diagnosis. Out of 12 (26.11%) benign cases, fibroadenoma was 06(13.06%) cases, benign phyllodes were 05(10.88%) cases, and in others 1 (2.17%) case of clear cell metaplasia. Out of 34(73.89%) malignant cases, 27(58.70%) cases were invasive ductal carcinoma, 02(4.35%) cases were ductal carcinoma in situ, and in other malignant cases including each case of invasive lobular carcinoma, medullary carcinoma, neuroendocrine tumor of the breast, anaplastic undifferentiated carcinoma, and papillary carcinoma with 2.17% respectively.

Table 3 shows that the maximum patients belonged to age 41-50 years followed by 31-40 years. The mean age was found 48.5 years with a range from 17 to 78 years.

Figure 1 showed the most common side of presenting lesion was the right breast with 26 cases (57%) followed by the left breast with 20 cases (43%).
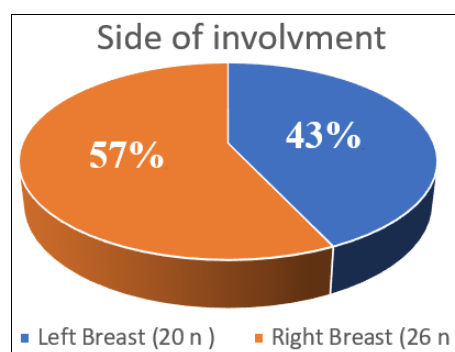
**Fig 1:** Pie chart showed side of involvement-wise patients breast lump distribution (N=46)
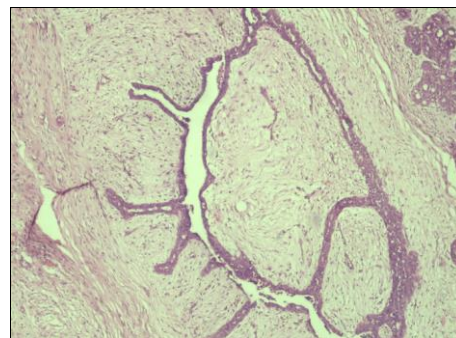
Fig 2: Breast core biopsy showing Fibroadenoma, mixed epithelial and stromal growth, having intra canalicular and peri canalicular pattern (H & E stain × 10X)
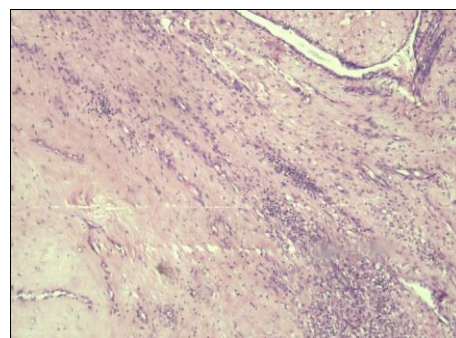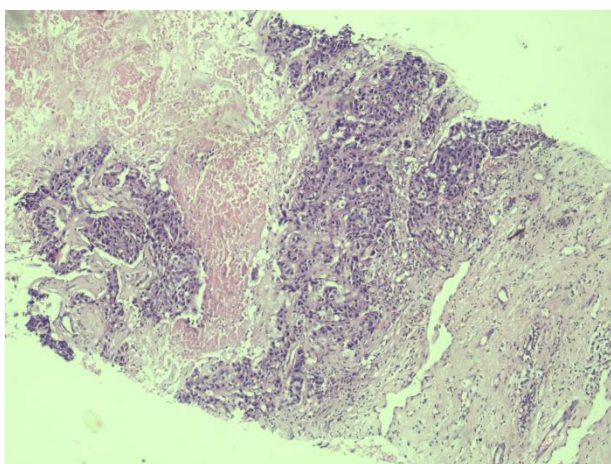

Fig 3: Breast core biopsy showing Benign phyllodes tumor, the benign glandular component with stromal hypercellularity (H & E stain × 10X)
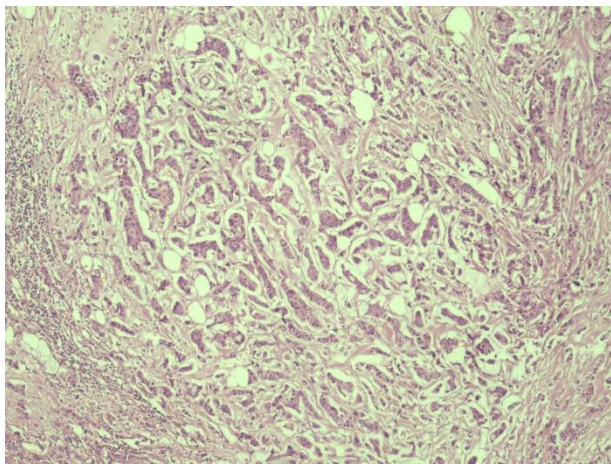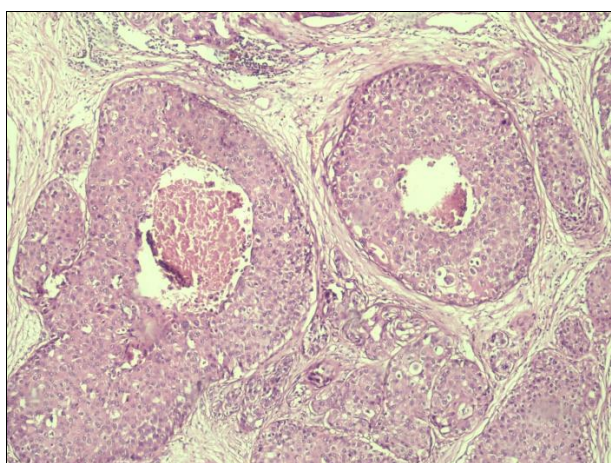
Fig 4: Breast core biopsy showing infiltrating ductal carcinoma, groups and sheets of atypical glandular cells which also infiltrate through the stroma (H & E stain × 4X)

Fig 5: Breast core biopsy showing Medullary carcinoma, large tumor cells in a syncytial fashion and are separated from the surrounding stroma, which is infiltrated by lymphocytes (H & E stain × 10X)

Fig 6: Breast core biopsy showing Ductal carcinoma in situ, solid pattern with necrosis, high nuclear grade (H & E stain × 10X)

When we compared histopathological diagnosis results of trucut biopsy with postoperative breast excision specimens as shown in Table 4 remained the same in all malignant cases. Based on the final histopathological diagnosis of the postoperative breast specimens, there were 32(69.55%) true-positive cases, 12(26.11%) true-negative cases, 2(4.35%) false-negative cases, and no false-positive cases.

Accordingly, the true positive rate, positive predictive value, and specificity is 100%. However, out of benign trucut cases, 2 (4.35%) cases also showed invasive tumors on excision specimens. Thus, the false negative rate is 5.88%, while the sensitivity is 94.1% and the negative predictive value is 85.7%. The overall diagnostic accuracy of trucut biopsy is 95.7%. Out of two discordant cases which showed an invasive tumor on excision specimens, one was initially diagnosed as atypical ductal hyperplasia on trucut biopsy and later proved as papillary carcinoma on excision biopsy. The other case was diagnosed as chronic mastitis but later showed an invasive ductal carcinoma component on the excision specimen.

Discussion
Breast cancer is one of the commonest causes of death in female cancer patients. Therefore early, and accurate diagnosis is of utmost importance for patient management. The pathological diagnosis can be obtained by using FNAC, trucut biopsy, and excision biopsy.

In pathological examination, core needle biopsy (CNB) is of great value both in nonpalpable and palpable lesions of the breast due to its higher sensitivity (94–99%) and specificity (99–100%) than fine needle aspiration cytology (FNAC) (sensitivity- 43.8–95.0%; specificity - 89.8– 100%) [5].

In present study showed that almost one-third (30.43%) of patients belonged to age 41-50 years. The mean age was found 48.5 years with a range from 17 to 78 years which is nearly similar to Mst. Mamtaz, *et al.* [6] with 33.3% of patients belonging to age 41-50 years with a mean age of 41.4 years with a range from 24 to 68 years. Also, a similar observation was found in different studies, Gojanur *et al.* [7] reported a mean age of 50.74 years, Hatada *et al.* [8] reported a mean age of 52 years, and Kinjal, *et al.* [9] reported a mean age of 51.9 years. All these studies have minute differences in age groups, which may be due to geographical variance.

This study observed that more than half 26 (57%) patients had right-side breast lumps and 20 (43%) had left breast-side lumps. A similar observation was found by Subangi *et al.* [10] who reported 108 (54%) patients were found on the right side, 91(45.5%) on the left, and 1(0.5%) in bilateral breast. Rahman *et al.* [11] (2019) observed right breasts were involved in 31 (53.4%) patients and the rest of the 27 (46.6%) patients had lesions in the left breast. Mst. Mamtaz, *et al.* [6] observed right breasts were involved in 44 (52.4%) patients, and the rest of the 40 (47.6%) patients had lesions in the left breast.

In this study, there were 14 (30.45%) benign and 32 (69.55%) malignant cases recognized by trucut biopsy. But Excision specimens' histopathological diagnosis includes 12 (26.11%) benign and 34 (73.89%) malignant cases. Various histological findings obtained were Fibroadenoma and Benign phyllodes tumors being more common in the benign category and Invasive ducal carcinoma being more common in the malignant category which is comparable to a study done by Gojanur *et al.*, (2017) [7] They reported 60.0% patients were in malignant and 40.0% in benign tumor category. Kinjal, *et al.* [9] observed that there were 9 (10%) benign and 81 (90%) malignant cases identified by trucut biopsy and Excision biopsy diagnosed 7 (7.7%) benign and 83 (92.2%) malignant cases, being Atypical ductal hyperplasia and Fibroadenoma being more common in benign lesions and Infiltrating duct carcinoma, not otherwise specified type most common in malignant lesions, like our study. Our institute being a tertiary care hospital, has a great

influx of patients with suspicious malignancy and a great level of transfer from the periphery area as well, thus justifying the high rate of malignancy.

The results of this retrospective study suggest that trucut biopsy is an accurate, reliable, and safe method of determining the diagnosis of malignancy in palpable breast lump patients. Our results yielded a high sensitivity of 94.1% with 100% specificity, and a PPV, NPV, and diagnostic accuracy of 100%, 85.7%, and 95.7% respectively. Besides, there were no false positive results. This necessitates that a trucut biopsy offers a breast cancer diagnosis with a great degree of confidence. So, any patient with trucut biopsy results that are consistent with breast carcinoma should be referred to the surgery department for immediate appropriate management. As shown in Table 5, We compared this study to several other studies that were conducted on the diagnostic usefulness of trucut biopsy in the diagnosis of breast masses [6, 9, 12, 13, 14, 15, 16], the present findings have decent similarities to those previously reported with regards to sensitivity, specificity, PPV, NPV, and accuracy.

Our study showed two cases of false negatives which lowered the diagnostic accuracy of the result to 95.7%. Both cases showed a benign lesion on trucut biopsy but turned out to be malignant lesions when excisions were done. The most probable explanation for the false-negative cases in the current study could be sampling error, inconclusive cores, slide misinterpretation due to non-representative material, or incorrect size of the needle used. Experts prefer to use larger needles in the evaluation of breast masses because of the propensity of these lesions to develop peripheral desmoplastic reactions. Furthermore, larger bore needles can contain larger volumes of sample tissue [17].

In discordant cases, Atypical ductal hyperplasia (ADH) which turned out to be invasive papillary carcinoma on excision can be explained by certain limitations of trucut biopsy as the merits of technique do not overcome the risk of underestimation of malignancy. In hyperplasia (with or without atypia) and papillary lesions, it is crucial to do an open biopsy to exclude carcinoma. In another case of chronic mastitis in trucut biopsy is due to non-represented cores, as the patient acquires secondary inflammation, masking the actual malignant component.

Because FNAC reports still have a percentage of ambiguity, lack vital information about the histopathological type, a small sample size that may not allow immunohistochemistry staining sufficiently, which could play a crucial role in the differential diagnosis [18], and often no appreciation of tissue architecture, resulting in a high rate of inadequate samples for histological assessment. As cytological smears cannot reliably predict invasion, benign and borderline lesions cannot always be reliably distinguished from their malignant counterparts [19]. All this information is of great importance for accurate preoperative evaluation by both surgeons and oncologists [20]. The trucut biopsy of palpable breast lesions based on a histological study of tissue specimens can provide reliable information. Core biopsy permits a preoperative knowledge of the histological type, grade, intrinsic behavior of the tumor, appliance of immunohistochemistry, and other prognostic parameters (receptor status, proliferative activity, ploidy, and expression of oncogenes and antioncogenes such as c-erbB-2 and p53), so trucut biopsy will guide the surgeon and the oncologist for ideal modern therapeutic strategy in surgical decision making [21, 22]. If a trucut biopsy is done instead of an excision biopsy, it will sufficiently lessen the wait time and can reduce cost. It is well tolerated by patients. We regard the procedure as a useful adjunct and indeed a practical option for accurate pre-operative diagnosis of palpable breast lesions [10].

Limitation of study
This was a small-scale single-centred study. The study population was selected from one chosen tertiary care hospital, so the result of the study may not imitate the precise depiction of the nation.

Table 1: Showing trucut biopsy findings of the study population (N=46)

Trucut biopsy	Frequency (n)	Percentage (%)
Benign		
Fibroadenoma	06	13.06%
Benign phyllodes tumor	05	10.88%
Clear cell metaplasia	01	2.17%
Chronic mastitis	01	2.17%
Atypical ductal hyperplasia	01	2.17%
Total	14	30.45%
Malignant		
Invasive ductal carcinoma	23	50.0%
Ductal carcinoma in situ	03	6.52%
Suspicious for malignancy	02	4.35%
Invasive lobular carcinoma	01	2.17%
Medullary carcinoma	01	2.17%
Neuroendocrine tumor of the breast	01	2.17%
Anaplastic undifferentiated carcinoma	01	2.17%
Total	32	69.55%

Table 2: Shows the final histopathological findings of the study population (N=46)

Final Histopathology	Frequency (n)	Percentage (%)
Benign		
Fibroadenoma	06	13.06%
Benign phyllodes tumor	05	10.88%
Clear cell metaplasia	01	2.17%
Total	12	26.11%

Malignant		
Invasive ductal carcinoma	27	58.70%
Ductal carcinoma in situ	02	4.35%
Invasive lobular carcinoma	01	2.17%
Medullary carcinoma	01	2.17%
Neuroendocrine tumor of the breast	01	2.17%
Anaplastic undifferentiated carcinoma	01	2.17%
Papillary carcinoma	01	2.17%
Total	34	73.89%

Table 3: Distribution of the study population by age (N=46)

Age (In years)	Frequency(n)	Percentage (%)
20 years or below	02	4.35%
21 to 30 years	02	4.35%
31 to 40 years	11	23.93%
41 to 50 years	14	30.43%
51 to 60 years	08	17.38%
61 years or above	09	19.56%
Mean Age: 48.5 years, Range (min-max) 17 – 78 years		

Table 4: Sensitivity, Specificity, PPV, NPV, and Accuracy of Tru cut biopsy

Trucut biopsy histopathology	Post-operative histopathological diagnosis		Total
	Malignant	Benign	
Malignant	32 (TP)	00 (FP)	32
Benign	02 (FN)	12 (TN)	14
Total	34	12	46

The following measures are used for evaluation
Sensitivity = TP / (TP + FN) × 100
Specificity = TN / (FP + TN) × 100
Positive predictive value = TP / (TP + FP) × 100
Negative predictive value = TN / (FN + TN) × 100
Accuracy = TP + TN / (TP + FP + FN + TN) × 100.

Table 5: Comparison of sensitivity, specificity, PPV, NPV, and accuracy between various studies for Tru cut biopsy of breast masses

Authors	Sensitivity	Specificity	PPV	NPV	Diagnostic Accuracy
Our study	**91.4%**	**100%**	**100%**	**78.6%**	**93.5%**
Mst. Mamtaz et al. [6]	95.9%	97.1%	97.9%	94.4%	96.4%
Kinjal, et al. [9]	96.3%	85.7%	98.7%	66.6%	95.5%
Rikabi et al. [12]	98.1%	100%	100%	98.9%	99.3%
Kulkarni et al. [13]	97.7%	94.2%	93.1%	98.1%	95.5%
Homesh et al. [14]	92.3%	94.8%	100%	100%	93.4%
Gukas et al. [15]	88.9%	96.8%	-	-	93.5%
Brunner et al. [16]	95%	100%	100%	90%-	-

Conclusion

A trucut biopsy of a breast lump is a more accurate, reliable, and safe procedure to obtain a preoperative histological diagnosis. The addition of immunohistochemistry staining to routine stains not only helps in molecular subcategorization but also early and accurate diagnosis, management, and prognostication. Any patient with a malignant diagnosis on trucut biopsy should be referred to the breast management team for immediate treatment. Therefore, trucut biopsy should be considered as a first line of tissue diagnosis in a patient with a breast lump prior to definitive treatments. Histological findings on trucut biopsy should be correlated with radiological details to avoid any false negative cases. Hence, we recommend trucut biopsy as an extremely suitable investigation for palpable breast lesions.

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Conflicts of interest
There are no conflicts of interest.

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