Asian Pacific Journal of Cancer Care
Vol 8 No 3 (2023), 539-543
Original Research

Diagnostic Accuracy of Fine Needle Aspiration Cytology, Triple Test and Tru-cut Biopsy in the Detection of Breast Lesion

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Background and Objective: The majority of breast disorders present as palpable masses. While most breast lesions are benign and do not progress to cancer, the accuracy of diagnosis can be improved through a combination of preoperative tests, including physical examination, mammography, fine-needle aspiration cytology (FNAC), and Tru-cut needle biopsy (TCNB) or core needle biopsy (CNB). FNAC has gained popularity as the primary diagnostic procedure for solid and cystic breast masses following a history and clinical examination. This study aimed to evaluate the diagnostic accuracy of FNAC in comparison to the Triple Test and TCNB for breast mass diagnosis.

Materials and Methods: The study was conducted at Tezpur Medical College and Hospital from January 2023 to May 2023. Female patients over the age of 20 with clinically palpable lumps were included. Complete clinical breast examination, imaging, and tissue sampling were performed to establish a definitive diagnosis and rule out cancer. Ultrasonography/Mammography, FNAC, and Tru-cut biopsy were performed concurrently in the same region, and the results were compared to the final histopathology as the gold standard.

Results: The majority of patients in the study were in the age group >60 years. Among the patients, 41 (58.5%) had involvement in the left breast, while 29 (41.4%) had involvement in the right breast. The most common site involved was the upper outer quadrant in 38 (54.2%) cases. The overall sensitivity of FNAC in our study was 93.75%, while Tru-cut biopsy and the Triple Test showed a sensitivity of 100%. The specificity for malignancy was 91.6% for FNAC, 93.6% for Tru-cut biopsy, and 95.6% for the Triple Test.

Conclusion: Each of the three techniques has its advantages and disadvantages. Core Needle Biopsy cannot replace FNAC and is not necessary for all breast lesions. It can be used as an adjunct in cases where cytology is definitive and biomarker testing is required. In our study, the Triple Test and Tru-cut biopsy demonstrated higher accuracy compared to FNAC. Tru-cut biopsy provided a histological diagnosis that was 100% consistent with the final histopathology report.

Introduction

Breast cancer is one of the most investigated cancers in the world, and new developments in its management are common. In India, the prevalence of breast cancer has now reached ENDEMIC levels. Numerous disorders, most of which manifest as lumps in the breast, including benign and malignant neoplasms, inflammatory diseases, and infections, can affect the breast. Breast lumps are among the most frequent complaints in surgical OPDs, thus it’s critical to distinguish between benign and malignant disorders before administering treatment. A comprehensive examination is

the key to accurate diagnosis. Twenty to thirty percent of all malignancies worldwide [1] are caused by it. Early diagnosis is of utmost importance in the medical industry because treating patients in latter stages is frequently ineffective. Lack of education and screening programmes causes the ignorant people to be unaware of the terrible disease. The goal of developing a sensitive, specific, effective, and affordable way to diagnose breast cancer was to examine the breast lumps using a variety of diagnostic techniques. examination of the breast, mammography, Trucut biopsy (needle core bio psy),ultrasonography,thermography,FNAC,open excision biopsy is all used in diagnostic work up of a palpable breast lump [2]. This goal has long been served by FNAC, in addition to clinical evaluation and mammography. It has been shown to be quite useful in the diagnosis of breast lumps since, in addition to being affordable, it also makes the cytological testing [3] process simple and quick. The first priority investigation for patients with breast lumps is frequently the FNAC. Nevertheless, it has some drawbacks, including the inability to distinguish between invasive and in situ carcinomas, a lack of sample size, and false negative results. One of the important methods for obtaining a histopathological diagnosis today is trucut biopsy, also known as core needle biopsy. It is manageable and can be done without hospitalisation.

The triple test, first reported in 1975, involves the physical examination, mammography, and fine-needle aspiration of palpable breast tumours. When all three components are concordant, that is, all benign or all malignant, the triple test score (TTS) is helpful and reliable for assessing palpable breast masses and can substitute open surgical biopsy for diagnosis [4]. If the findings are inconsistent, the patient may be submitted to further testing and an open surgical biopsy. Clinical breast examination, breast imaging (Breast Ultrasound and/or Mammogram), and fine needle aspiration cytology are the three components of the Triple test.

A triple test was also submitted to a score system for the parameters mentioned earlier. Each criterion receives one to three points: benign (1 point), suspicious (2 points), and malignant (3 points).The total score between 3 and 9 is used to interpret the results.

1. A total score of 3-4 indicates a benign lesion.

2. A total score of 5 indicates an intermediate risk that necessitates an excisional biopsy.

3. A total score of 6 or above indicates the possibility of cancer and the need for surgical intervention.

TRU-CUT Biopsy: When evaluating a discrete lump in the breast, an ultrasound-guided automated Tru-cut needle biopsy may be utilised instead of fine needle aspiration cytology. The procedure’s sensitivity for diagnosing substantial pathology varies from 88.7% to 97%, while its specificity ranges from 96.8% to 100% [5-7]. When utilised in conjunction with a triple assessment, the sensitivity rises to 97.9% [7].

Core biopsy (CB) usage has grown, although not necessarily for evidence-based reasons. CB and FNAC do not contradict one other. FNAC should be used in the diagnosis of benign, symptomatic lesions, and CB as an alternative diagnostic modality should be used with caution, e.g., in the diagnosis of impalpable masses, microcalcifications, or a clinically apparent malignancy where preoperative chemotherapy is planned. CB should not be utilised to compensate for poor FNAC performance. Where expert cytopathologists are available, FNAC and CB may complement each other to give a highly accurate, quick, and cost-effective method of patient triage [8].

Materials and Methods

From January 2023 to May 2023, 70 consecutive females with palpable breast lumps were examined at the surgical out-patient department of the Tezpur Medical College and Hospital. The study included all girls older than 20 with palpable breast masses. Men, impalpable masses,

recurring cancer, and age less than 20 years.ll patients provided written informed consent, which was obtained. Each patient underwent FNAC and tru-cut biopsy simultaneously after a thorough history, clinical examination, and mammography in those patients (> 40 years) who were indicated. A skilled surgeon performed the tru-cut biopsy, while a histopathologist performed the FNAC. To reduce the danger of bias, the FNAC and tru-cut biopsy slides were examined by two different histopathologists. Later, all of them underwent mastectomy or excision biopsy of the lump for definitive diagnosis confirmation. Both techniques results were collected, and their sensitivity levels were computed and compared.

FNAC was performed using an aseptic approach and a disposable syringe with a 21–23 gauge needle. Under local anaesthesia, tru-cut biopsy was performed on the lesions using needles between 14 and 16 gauge.

Results

In this study 70 females underwent FNAC, Tru-cut biopsy and Triple Assessment simultaneously. Mean age was 51.1

Left breast was involved in 41 (58.5%) patients and right breast in 29 (41.4%) patients.The most frequent site involved was upper outer quadrant in 38 (54.2%) patients centeral in 18 (25.7%) patients lower inner in 8 (11.4%) patients and upper inner in 6 (8.5%) respectively.

FNAC diagnosed breast cancer in 24 patients and 4 cases one of benign phyllodes, one atypical epithelial hyperplasia and two giant fibroadenoma were reported false positive. Four cases of invasive ductal carcinomas were reported false negative. Fibroadenomas were diagnosed in 26 cases, 24 confirmed on biopsy and one found out to be phylloides tumor and other epithelial hyperplasia each (false positive).

Out of 70 breast lesion 60 were diagnosed correctly on FNACwith 93.75% sensitivity and specificity for malignancy was 91.6% (Table 1).

Age group (in years)	Number of cases
<30	6
30-39	8
40-49	14
50-59	20
>60	22

Table 1. Showing Number of Breast Lump Cases in Different Age Groups.

Trucut biopsy diagnosed the carcinoma in 26 patients. Invasive ductal carcinoma was diagnosed correctly in 16 cases. 10 cases which were only reported malignant on tru-cut came out to be invasive ductal carcinoma in 4 cases, lobular carcinoma in 3 cases and each case of benign phylloides tumor, atypical epithelial hyperplasia and giant fibroadenoma were false positive. 34 cases of fibroadenoma diagnosed on tru-cut were confirmed accurate on biopsy. Sensitivity calculated is 100%. with sixty seven out of seventy were reported accurately with no false negative result and specificity for malignancy is 93.6% (Table 2).

FNAC Diagnosis	Number of cases	Final Histopathology	False Positive	False Negative
Benign	20	Fibroadenoma - 11	-	4
		Phylloides Tumor - 3		
		Epithelial Hyperplasia -2		
		Ductal Cancer -4		

Fibroadenoma	26	Fibroadenoma -22	2	-
		Phyllodes tumor -1		
		Epithelial hyperplasia-1		
Ductal carcinoma	3	Ductal cancer - 3		
Malignant	21	Ductal cancer - 13	4	-
		Lobular Cancer - 4		
		Atypical Epithelial Hyperplasia -1		
		Phyllodes -1		
		Giant Fibroadenoma -2		

Table 2. Showing Number of Patients as Per Different Category of Breast Lesion after FNAC.

Triple Test diagnosed the carcinoma in 26 patients. Invasive ductal carcinoma was diagnosed correctly in 17 cases. 9 cases which were only reported malignant on tru-cut came out to be invasive ductal carcinoma in 4 cases, lobular carcinoma in 2 cases and each case of benign phylloides tumor and giant fibroadenoma were false positive. 34 cases of fibroadenoma diagnosed on Triple Test confirmed accurate on biopsy. Sensitivity calculated is 100%. with sixty eight out of seventy were reported accurately with no false negative result and specificity for malignancy is 95.6% (Table 3).

Tru-cut Diagnosis	Number of patients	Final Histopathology	False Positive	False Negative
Benign	8	Fibroadenoma - 4	-	-
		Phylloides Tumor - 2		
		Epithelial Hyperplasia -2		
Fibroadenoma	34	Fibroadenoma - 34	-	-
Phylloides	2	Phylloides -2	-	-
Ductal Cancer	16	Ductal Cancer - 16	-	-
Malignant	10	Ductal cancer - 4	3	-
		Lobular Cancer - 3		
		Atypical Epithelial Hyperplasia -1		
		Phyllodes -1		
		Giant Fibroadenoma -1		

Table 3. Showing Number of Patients as Per Different Category of Breast Lesion after Tru-cut Biopsy.

The overall sensitivity of FNAC in our study was 93.75% , tru-cut biopsy is 100% and that of triple test is 100% and specificity for malignancy was 91.6%, 93.6 and 95.6% for FNAC, tru-cut biopsy and triple test respectively.

Discussion

In our study, FNAC and trucut biopsy were performed on the same lesion and the operator dependence has been standardized. People used to undergo excision biopsy of fibroadenoma to remove the tumor and establish diagnosis. Now tru-cut biopsy is widely used and lesion is left undisturbed in the breast if the diagnosis is fibroadenoma. Fibroadenoma was the most common histopathological diagnosis and comprised 54.2% of the total cases. In our study, 38 cases of fibroadenomas were reported on histopathology, of them 34 were correctly diagnosed on Tru-cut biopsy reflecting the high accuracy of trucut biopsy (Table 3). In 3 (4.2%), 16 (22.8%) and 17 (24.2%)of these were detected on FNAC, Trucut samples and Triple test accurately detected invasive ductal cancer. The remaining 13 (18.5%), 4 (6.1%) and 4 cases in FNAC Trucut biopsies and triple test, respectively, were reported as malignant (Tables 2, 3 and 4).

Triple Test Diagnosis	Number of patients	Final Histopathology	False Positive	False Negative
Benign	8	Fibroadenoma - 4	-	-
		Phylloides Tumor - 2		
		Epithelial Hyperplasia -2		
Fibroadenoma	34	Fibroadenoma - 34	-	-
Phylloides	2	Phylloides -2	-	-
Ductal Cancer	17	Ductal Cancer - 17	-	-
Malignant	19	Ductal cancer - 4	2	-
		Lobular Cancer - 3		
		Phyllodes -1		
		Giant Fibroadenoma -1		

Table 4. Showing Number of Patients as Per Different Category of Breast Lesion after Triple Test.

Four incidences of invasive ductal carcinoma were identified on histology out of 20 benign lesions on FNAC (Table 2). respectively."Phyllodes tumours can spread to other parts of the body if they are malignant and have a 20% to 40% local recurrence rate [9]. In our investigation, two out of five phylloides tumours had a correct Tru-cut biopsy diagnosis.The remaining three were described as benign (two) and malignant (one). FNAC identified three of the phylloides tumours as benign lesions, one as a fibroadenoma, and one as malignant after failing to diagnose any of the tumours. Overall FNAC sensitivity in our study was 93.75%, and trucut biopsy sensitivity was 100%. In a study that was equivalent to ours, the sensitivity of FNAC and Trucut was found to be 88% and 96%, respectively [10]. Our study's results are comparable to those from another study [11] that indicated the FNAC and trucut biopsy's sensitivity as 81.4% and 91.5%, respectively. Our study's 93.75% FNAC sensitivity was equivalent to those of prior research [12-14]." The 100% sensitivity of the trucut biopsy in our study is comparable to the 96.7% and 100% sensitivities of the trucut biopsy in studies by Loffeet al [15] and Memonet a [16]. In our investigation, the FNAC and tru-cut specificities for malignancy were 91.6% and 93.6%, respectively, comparable to the FNAC (100%) and tru-cut biopsy (100%) in one study [4,17].

In conclusion, all three techniques have advantages and disadvantages. Core Needle Biopsy cannot be used in place of FNAC, and it is not required to identify all breast lesions.It can be utilised as an adjuvant in circumstances when cytology is definitive and biomarker tests are required. triple test and trucut were more accurate than FNAC in our testing.Trucut biopsy was able to provide histological diagnosis, and the findings were 100% consistent with the final histopathology report.

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