ORIGINAL ARTICLE

Diagnostic Accuracy of FNAC for Detection of Malignancy in Palpable Breast Lump and its Comparison with Tru-Cut Biopsy

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ABSTRACT

Breast cancer is the commonest malignancy in women worldwide and leading cause of cancer related deaths in women, almost half of these occurring in developing countries. Aim was to know the diagnostic accuracy of FNAC for detection of malignancy in palpable breast lump and its comparison with tru-cut biopsy

Methodology: Six months following the publication of this report, researchers in the Surgical Department of Allied Hospital Faisalabad conducted this study. Starting on March 31st, 2019, and running all the way through September 30th, 2019. Allied Hospital Faisalabad's ethics council approved the study's summary, and patients who presented to the hospital's breast clinic with a palpable breast lump met the criteria for inclusion in the research.   Across all patients, histopathology was performed on FNAC, tru-cut, and excisional biopsy specimens. H&E staining was performed on both the tru-cut biopsy and tissue specimens from later excision procedures to examine the histological characteristics of the tumor tissue.

Results: In our study, out of 190 cases, frequency of malignancy on was recorded in 28.42%(n=54), the diagnostic accuracy of Tru-cut biopsy for detection of malignancy in patients with palpable breast lump taking histopathology examination after excision biopsy (HPE) as gold standard was recorded as 80.33% sensitivity, 96.12% specificity, 90.74% positive predictive value,91.18% negative predictive value and 91.05% accuracy rate, likelihood ratio was calculated as 20.72 and diagnostic accuracy of FNAC biopsy for detection of malignancy in patients with palpable breast lump taking histopathology examination after excision biopsy (HPE) as gold standard was recorded as 70.49% sensitivity, 93.80% specificity, 84.31% positive predictive value, 87.05% negative predictive value and 86.32% accuracy rate, likelihood ratio was calculated as 11.37.

Conclusion: As far as diagnostic accuracy for the diagnosis of malignancy in patients with palpable breast lumps, FNAC and Tru-cut biopsy are both good, although Tru-cut biopsy is more accurate than FNAC in terms of detecting the disease.

Keywords: Palpable breast lump, malignancy, diagnosis, FNAC, Tru-cut biopsy, diagnostic accuracy

INTRODUCTION

Most cases of breast cancer and the majority of cancer-related deaths in women occur in developing countries, where breast cancer is the most frequent form of the disease.[1] Every year, tens of millions of new cases are discovered around the world.[1-2] The sooner a condition is diagnosed and treated, the better the prospects of a long, healthy life.[2]

Any lump in the breast that can be felt should be evaluated for indicators of cancer before surgery. Procedures for routine examination of breast lesions include a clinical breast examination, radiographic evaluation, and pathological analysis.[3] There are numerous approaches to performing a pathological evaluation. FNAC, core needle biopsy/Tru-Cut biopsy, and incisional/excisional biopsy are all examples of these procedures. Malignant tumours can only be diagnosed through excision of the tumour and subsequent histological examination.[3] The fundamental purpose of pathological diagnosis is to distinguish between cancerous lesions that necessitate more aggressive treatment and benign lesions that can be treated more conservatively.[2]

Pathologists prefer Tru-Cut biopsy because it provides enough tissue for them to make a preoperative diagnosis of cancer, distinguish between different cytological types, and stain for receptor status. This information can help surgeons and oncologists determine the best course of treatment for patients with benign breast masses they find during the course of their evaluation.[3] Tru-Cut Biopsy may not be sufficient for tumours with necrosis and bleeding, or for tiny tumours linked with fibrosis, so a second Tru-Cut Biopsy or another modality may be necessary.[3]

FNAC is considered a vital tool and an early diagnostic aid in the evaluation of palpable breast lumps as it is reliable, rapid, cost effective and accurate; and has been used for a long time.[4] With this method, the patient experiences minimal discomfort and can have it repeated as many as necessary with low risk to his or her health.[5] Because of the reliance on the operator, FNAC might produce false positive or false negative results even when the specimen is adequate for an accurate cancer diagnosis.[3] Histopathology is the gold standard for determining whether or not a tumor is malignant.[2]

False-negative FNAC and False-positive Tru-Cut biopsy had sensitivity, specificity positive predictive value, negative predictive value and diagnostic accuracy of 86.3 per cent and 69.9 per cent, respectively in identifying cancer in comparison with FNAC.[3]We need to consider these statistics in the light of other advantages and disadvantages with both techniques. We need to consider invasiveness, need for specialized equipment, financial burden and other similar variables associated with FNAC. However, statistics show that use of FNAC is declining in recent years.[5]A study by Wang M, et al. found that both FNAC and tru-cut biopsy performed well clinically, and FNAC should still be the primary choice for suspected non-palpable breast lesions.[6] The rationale of this study is as limited local data is available regarding the diagnostic accuracy of FNAC in comparison with Tru-cut biopsy and TRU-CUT biopsy need more expertise and skills along with a tru-cut needle making it costly, so I have designed this study.

MATERIAL AND METHODS

With the gold standard being Histopathology examination following excision biopsy (HPE), the study aimed to explore the diagnostic accuracy of FNAC and Tru-cut biopsy in detecting cancer in patients with palpable breast masses. The research was carried out using a cross-sectional (validation) strategy. Six months following the publication of this report, researchers in the Surgical Department of Allied Hospital Faisalabad conducted this study. Starting on March 31st, 2019, and running all the way through September 30th, 2019.

It was determined that the sample size needed for the study was between 69% and 100% sensitive, 55% specific, and 31.82 percent prevalent using a sensitivity and specificity sample size calculator; the accuracy of the sample size was within a 95%

confidence interval, and the population under study was estimated to be 69% sensitive and 55% specific. The non-probability consecutive sampling technique yielded a sample size of 190.

Criterion for participation in the research Females with palpable breast lumps who met the operational description between the ages of 18 and 60 participated in the research. We were unable to include men under the age of 18 or those with non-palpable breast lesions in this study. Recurrences or tumours that have been degraded due to breast cancer treatment are already being treated when the skin is afflicted by fungal infections or has open wounds.

Procedure for gathering data has been followed. Patients who presented to the breast clinic at Allied Hospital Faisalabad with a palpable breast lump met the study's definition and had their summary approved by the hospital's ethics committee. The study's participants gave their permission to participate. Name and age were entered into a proforma along with bio data that included phone numbers and e-mail addresses. A thorough physical examination included taking a thorough medical history, paying particular attention to established risk factors for the development of breast cancer. All patients had their own files, and the information they provided was kept private. Following histology, all patients received FNAC, Tru-Cut biopsy and excision biopsy. A spring-loaded core needle biopsy instrument was used to perform a tru-cut biopsy under local anesthetic. Three tissue samples were deemed sufficient. In a jar labelled with the patient's name and hospital registration number, these were stored in formalin and submitted to the pathology lab to be examined. The FNAC was done with a 21G or 23G needle and a 10-mL syringe, with repeated passes through the lump with negative pressure in the syringe. After that, the aspirate was smeared onto a slide and allowed to air dry. The slides were sent to the laboratory labelled with the patient's hospital identification number. Cellular cytology samples were stained with Papanicolaou and May Grunwald Giemsa. Both the Tru-cut biopsy and tissue samples acquired from later excision procedures were stained with Haematoxylin and Eosin (H&E) to examine the histological features. Based on diagnostic criteria used by NHSBSP (National Health Service Breast Screening Program), FNAC and Tru-cut biopsy results were given (table no. I). A board-certified consultant pathologist examined each sample.

By utilizing SPSS V-20, all of the gathered data was input and evaluated Calculations for all quantitative variables such as the age of the individual have been made. A two-by-two table was used to calculate frequency and percentages for qualitative characteristics such as sensitivity, specificity, true positive, false positive, PPV, NPV and diagnostic accuracy. Age-specific likelihood ratios and ROCs were calculated. The significance level was set at P-value 0.05.

RESULTS

More than 120 patients with a palpable breast lump were participated in the study to investigate the diagnostic accuracy of FNAC and Tru-cut biopsy for the diagnosis of malignancy after excision biopsy (HPE). 56.84% of 108 participants were between the ages of 18 and 40, while 43.16% of the n=82 participants were between the ages of 41 and 60. The mean+sd was computed as 40.31+8.62 years of age. This malignancy was found in 28.42% (n=54) of the samples, but only 71.58 % (n=136) had it. After excisional biopsy (HPE), histopathology examination was used as the gold standard, and the diagnostic accuracy of Tru-cut biopsy was recorded as 80.33% sensitivity, 90.74% positive predictive value, 91.18% negative predictive value and an accuracy rate of 91.05%, the likelihood ratio was calculated as 20.72.

In this study, 70.49% sensitivity, 93.80% specificity, 84.31% positive predictive value, 87.05% negative predictive value, and 86.32% accuracy rate were observed for FNAC biopsy in patients with palpable breast lumps who underwent histopathological analysis after excision biopsy (HPE) as a gold standard.

Table 1: Age Distribution And Malignant Disease Status Among The Patients Enrolled

	Age(in years)	No. of patients	%
Age Distribution(n=190)	18-40	108	56.84
	41-60	82	43.16
	Total	190	100
	Mean+SD	40.31+8.62	
Frequency Of Malignancy On Gold Standard (n=190)	Malignancy	No. of patients	%
	Yes	54	28.42
	No	136	71.58
	Total	190	100

Table 2: Diagnostic Accuracy Of Tru-Cut Biopsy For Detection Of Malignancy In Patients With Palpable Breast Lump Taking Histopathology Examination After Excision Biopsy (Hpe) As Gold Standard (n=190)

TRU-CUT	Histopathology		Total
	Malignant	Nonmalignant	
Positive	True positive(a) 49	False positive (b) 5	a + b 54
Negative	False negative(c) 12	True negative (d) 124	c + d 136
Total	a + c 61	b + d 129	190

Sensitivity= a / (a + c) x 100 =   80.33%
Specificity= d / (d + b) x 100 =   96.12%
Positive predictive value = a / (a + b) x 100 =   90.74%
Negative predictive value = d / (d + c) x 100 = 91.18 %
Accuracy rate = a + d / (a + d + b + c) x 100 = 91.05%
Likelihood ratio=20.72

Table 3: Diagnostic Accuracy Of Fnac Biopsy For Detection Of Malignancy In Patients With Palpable Breast Lump Taking Histopathology Examination After Excision Biopsy (Hpe) As Gold Standard (n=190)

FNAC	Histopathology		Total
	Malignant	Nonmalignant	
Positive	True positive(a) 43	False positive (b) 8	a + b 51
Negative	False negative(c) 18	True negative (d) 121	c + d 139
Total	a + c 61	b + d 129	190

Sensitivity= a / (a + c) x 100 =   70.49%
Specificity= d / (d + b) x 100 =   93.80%
Positive predictive value = a / (a + b) x 100 = 84.31%
Negative predictive value = d / (d + c) x 100 = 87.05%
Accuracy rate = a + d / (a + d + b + c) x 100 = 86.32%
Likelihood ratio=   11.37

DISCUSSION

Every day new discoveries are being made to improve the treatment of breast cancer around the globe. Malignant neoplasms, inflammatory disorders and infections are among the many ailments it harbours, and the majority of these manifest as breast lumps in women. Identifying the condition requires a good understanding of normal breast anatomy, physiology, and pathology.

In order to find a sensitive, specific, efficient, and cost-effective technique of diagnosing breast cancer, a variety of diagnostic approaches have been developed. When a palpable breast lump is being investigated for a possible diagnosis, a variety of imaging modalities, including mammography, ultrasound, thermography, FNAC, and open excision biopsy, are employed.

With insufficient local data on FNAC's ability to accurately diagnose breast tumours compared to Tru-cut or TRI-CUT biopsy, we decided to conduct this study in order to learn more about the diagnostic accuracy of FNAC in the histopathological diagnosis process. It is possible to diagnose breast cancer early and accurately by employing FNAC, making the procedure more cost-effective and not needing the use of specialised theatre equipment.

In our study, out of 190 cases, 56.8% (n=108) were between 18-40 years of age whereas 43.16%(n=82) were between 41-60 years of age, mean+sd was calculated as 40.31+8.62 years of age. Frequency of malignancy on gold standard was recorded in 28.42%(n=54), the diagnostic accuracy of Tru-cut biopsy for detection of malignancy in patients with palpable breast lump taking histopathology examination after excision biopsy (HPE) as

gold standard was recorded as 80.33% sensitivity, 96.12% specificity, 90.74% positive predictive value, 91.18% negative predictive value and 91.05% accuracy rate, likelihood ratio was calculated as 20.72 and diagnostic accuracy of FNAC biopsy for detection of malignancy in patients with palpable breast lump taking histopathology examination after excision biopsy (HPE) as gold standard was recorded as 70.49% sensitivity, 93.80% specificity, 84.31% positive predictive value, 87.05% negative predictive value and 86.32% accuracy rate, likelihood ratio was calculated as 11.37.

The sensitivity, specificity, positive predictive value, negative predictive value, and diagnostic accuracy of Tru-Cut biopsy were 88.3%, 100%, 100%, 53.3%, and 86%, respectively, in identifying cancer, according to previous investigations.[3] However, the use of FNAC in recent years has decreased. 5 FNAC and tru-cut biopsy both show excellent clinical performance, and FNAC should still be the primary choice for suspected palpable breast lesions, according to Wang M, et al. 6 Our findings are in line with those of the previous research, which reveal that Tru-cut biopsy was superior to FNAC in terms of yield.

According to Rahul Singh R and colleagues' research, FNAC was found to be more accurate than TCNB for the diagnosis of breast masses, with a sensitivity of 84.34 percent compared to 97.1 percent. In comparison to FNAC, TRUCUT was found to be more accurate. FNAC and Core Needle Biopsy were found to be complementary in the diagnosis of breast lesions and to be beneficial.[7]

It was found that even when good quality clinical, radiographic, and histological tests were used in conjunction with a systematic use of core biopsy for the detection of breast cancer, several studies still showed its value. When histological examination of tissue specimens is combined with tru-cut biopsy of palpable breast lesions, all the necessary information can be gleaned. A tru-cut biopsy allows the surgeon and oncologist to make an ideal modern therapeutic strategy in surgical decision-making by providing them with preoperative knowledge of the histological type and prognostic parameters (receptor status, proliferative activity, ploidy, and expression of oncogenes and antioncogenes such as c-erbB-2 and p53).[8]

Neo-adjuvant therapy can be used in the future if necessary. Small, palpable lesions in breast lumps have replaced FNAC due to the fact that tru-cut biopsy rarely provides insufficient samples, even for these lesions. It's less intrusive than open surgery, and tru-cut biopsy is no exception. There is a significant reduction in the volume of tissue removed, breast deformity, and the impact on mammography. Non-palpable lesions that have a benign pathology are not surgically removed. Surgery for cancerous tumours can be performed in a single visit.[7]

As a result, in poor nations, Tru-cut biopsy can be performed routinely as part of a triple examination for worrisome breast lesions. As a result, needless surgery, frozen sections and axillary dissection are avoided. The majority of cancer surgeries are performed in a single session. It's carefully thought out, and the patients are quite involved in the process. There's no reason not to employ this strategy, which lowers the cost of breast cancer diagnosis and treatment while also safeguarding the rights of patients.

CONCLUSION

Tru-cut biopsy is superior to FNAC in terms of diagnostic accuracy for the diagnosis of cancer in patients with palpable breast lumps. There is no reason not to use this method, which protects patients' rights while reducing the financial burden of diagnosing and treating breast cancer.

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