

Original research article

A Prospective Comparative study between Fine needle aspiration cytology and Core needle biopsy in diagnosis of palpable breast lumps

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Abstract

Breast carcinoma is the most common cause of mortality and morbidity among women and a lump in the breast is the most common presenting complaint. It is essential to correctly diagnose this condition to prevent misdiagnosis of cancer. The role of Fine needle aspiration cytology (FNAC) and Core needle biopsy (CNB)/Trucut biopsy of breast lumps is to rule out and diagnose cancer accurately and to obtain tissue for analysis. We performed a prospective study on 50 patients to compare the diagnostic efficacy of FNAC and CNB with final histopathological report of excised specimen as a gold standard for diagnosis. Patients underwent all three procedures namely FNAC, CNB, and surgery. Staining of cytology smears was done using Haematoxylin and Eosin (H&E), May-Grunwald-Giemsa (MGG) and Papanicolaou (Pap) stains. For CNB and tissue specimens obtained from excisional surgeries, Haematoxylin and Eosin (H&E) stain was used. In diagnosing breast carcinoma, FNAC depicted sensitivity of 70.8%, specificity of 96.2%, positive predictive value (PPV) of 94.4%, negative predictive value (NPV) of 78.1%, and diagnostic accuracy as 84% whereas CNB showed similar values as 87.5%, 100%, 100%, 89.7%, and 94% respectively. Our study concluded that CNB had higher sensitivity, specificity, PPV, NPV, and diagnostic accuracy than FNAC and therefore is more accurate than FNAC in diagnosing breast carcinoma. But in centers where facilities and equipment are still not available for CNB, FNAC is still useful as an initial investigation as it is a simple, rapid, and economical method requiring less expertise.

Keywords: Breast carcinoma, FNAC, CNB, Sensitivity, Specificity.

Introduction

Breast diseases form a significant proportion of cases in both developed and developing countries and it is essential to differentiate benign from malignant disease before definitive treatment. Wide application of screening programs has permitted a marked increase in the number of cancer detection. Breast cancer is the most common cancer among global as well as Indian females [1]. FNAC is a study of cellular material obtained by a small-gauge needle

attached to an airtight 10 ml syringe. It is an easy, quick-to-perform, out-patient, and virtually painless procedure. With a high percentage of true positives, virtually no complications, and no requirement of anesthesia, it is established as an important patient-friendly out-patient first diagnostic procedure. Recently, CNB has been introduced for the tissue diagnosis of breast lumps. It is advantageous as tumor grading and receptor status (estrogen/progesterone/Her-2 neu receptor) can be performed on a CNB specimen. It also avoids the need for an open surgical biopsy for tissue diagnosis. This study was undertaken to analyze the diagnostic accuracy of FNAC and CNB.

Material and Methods:

We conducted a prospective comparative cross-sectional study of 50 female patients. This study was carried out at Sir T Hospital and Govt. Medical College, Bhavnagar (Gujarat), India by Department of Surgery and Department of Pathology from September 2018 to August 2020. We included 50 female patients aged 18 to 85 year with a palpable lump in breast attending surgical OPD as a study group. We took a detailed clinical history with physical examination of all the patients included. After obtaining informed and valid consent, all patients underwent FNAC and subsequently CNB. All these patients were then subjected to definitive surgery and final histopathological diagnosis of the excised specimen was used as a gold standard for comparison with FNAC and CNB results. Results of FNAC, CNB, and final histopathology were reported using National Health Service Breast Screening Program (NHSBSP) criteria (Table 1).

FNAC was performed using a 22-gauge needle and 10ml syringe. The breast lump was fixed by the locating hand with slight stretching of the overlying skin. Using an alcohol impregnated swab, the site to be aspirated was cleaned. The needle is introduced into the lump through the skin with negative pressure applied and multiple passes were made through the lesion, at varying angles of entry into the lump. It was continued till a small droplet of fluid containing cellular material is visualized at the hub of the needle.

Then negative pressure was released and the needle was withdrawn from the skin. The needle was separated from the syringe and the obtained specimen was expressed on a glass slide, fixed with 95% alcohol, and stained subsequently using Haematoxylin and Eosin (H&E), May-Grunwald-Giemsa (MGG), and Papanicolaou (Pap) stains. Cytological features were examined under a microscope and reported according to NHSBSP criteria by expert cytopathologist.

Core needle biopsy was done using a biopsy gun (Bard Magnum®) of a 14-gauge needle. After localizing and immobilizing the lump by palpation, under aseptic technique, a local infiltrating anesthetic (2% Lignocaine) was administered and a biopsy specimen was obtained using six to eight successive insertions with different angulations of the needle and the obtained specimen was sent to Pathology department. Haematoxylin and Eosin (H&E) staining was done on both the CNB and tissue specimens obtained from subsequent excision surgeries to see the histological features.

The collected data were analyzed using statistical software (Instat) and presented using Microsoft Word and Excel programs.

Table 1: NHSBSP reporting categories for FNAC and CNB [2]

Cytology Reporting		CNB and Histopathology Reporting	
C1	Unsatisfactory	B1	Unsatisfactory/normal tissue only
C2	Benign	B2	Benign
C3	Atypia probably benign	B3	Benign, but of uncertain malignant
C4	Suspicious of malignancy	B4	Suspicious of malignancy
C5	Malignant	B5	Malignant

Results:

In this study, patients having breast lump were ranged from 18 years to 85 years (mean 40.4 years with SD16.9) with the most common age group being 15-30 years. The most common age group having breast carcinoma was 41-50 years. Right breast was involved in 23 cases (46%) whereas left breast was involved in 27 cases (54%). Out of all breast lumps, 24 lumps were diagnosed finally as malignant. Breast lumps involving malignancy were found slightly more on right side (13 cases, 54.2%) as compared to left side (11 cases, 45.8%). Among all patients, the size of the breast lump ranged from 2 cm to 15 cm with mean size 4.7 cm and SD2.5. Most benign lumps (84.6%) were less than 5 cm in size. Malignant lumps were distributed as 54.2% (<5 cm) and 45.8% (5-10 cm). The majority of all breast lumps (56%) were located in the upper outer quadrant (UOQ) of breast which was also found in benign and malignant lumps. The next involved quadrant was upper inner quadrant having 12 patients i.e. 24% of total cases (7 benign and 5 malignant).

Final histopathological examination from excisional surgery confirmed malignancy i.e. carcinoma in 24 patients (48%) from all patients included in the study.

Distribution of all patients according to different FNAC and CNB categories are given in table 2 and 3.

Table 2: Different FNAC categories (n = 50)

	FNAC Categories					Total
	C1	C2	C3	C4	C5	
No of patients and their percentages	3	21	3	5	18	50
	6%	42%	6%	10%	36%	100%

Table 3: CNB categories (n = 50)

	CNB categories					Total
	B1	B2	B3	B4	B5	
No of patients and their percentages	2	25	1	1	21	50
	4%	50%	2%	2%	42%	100%

FNAC showed sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV), and diagnostic accuracy as 70.8%, 96.2%, 94.4%, 78.1%, and 84% respectively in diagnosing malignancy (Table – 4).

Table 4: Comparison of FNAC diagnosis with post-surgery histopathological diagnosis (n = 50)

		Final histopathological diagnosis		Total
		Malignant	Non-malignant	
FNAC	Malignant (C5)	17 (True positive)	1 (False positive)	18
	Non-malignant (C1+C2+C3+C4)	7 (False negative)	25 (True negative)	32
Total		24	26	50

CNB had sensitivity, specificity, PPV, NPV, and diagnostic accuracy of 87.5%, 100%, 100%, 89.7%, and 94% (Table – 5).

Table 5: Comparison of CNB diagnosis with post-surgery histopathological diagnosis (n = 50)

		Final histopathological diagnosis		Total
		Malignant	Non-malignant	
CNB	Malignant (B5)	21 (True positive)	0 (False positive)	21
	Non-malignant (B1+B2+B3+B4)	3 (False negative)	26 (True negative)	29
Total		24	26	50

Discussion:

Traditionally the gold standard method for diagnosis of a breast lump is excisional biopsy. This study was conducted to compare between FNAC and CNB for preoperative diagnosis of breast lump. In our study, patients having breast lump were ranged from 15 years to 85 years (mean 40.4 years). In a study by Abhijit Saha et al in 50 patients, the age range was 26-75 years (mean = 47.4 years) [3]. In our study, the most common age group having breast carcinoma was 41-50 years, whereas Khemka et al found a peak incidence of breast carcinoma between 40-44 years in their study which is comparable to our study [4]. We found that malignant breast lumps were slightly more on right side (54.2%) as compared to left side (45.8%). Aljarrah et al stated in their study that breast cancer occurs almost equally in the right and left breasts [5]. Among all patients in our study, the size of the breast lump ranged from 2 cm to 15 cm with a mean size of 4.7 cm. In a study by Abhijit Saha et al, the size of the lumps ranged from 3 cm to 12 cm with a mean size of 6.38 cm [3]. In the present study, 56% of all breast lumps were found in UOQ which is comparable to the study by Abhijit Saha et al wherein they found that 50% of all lumps were located in UOQ [3]. Hussain found in his study that 58% of patients were having a breast lump in UOQ [6]. Comparison of results of various notable studies is presented in table 6.

Table 6: Comparison of results of various studies

Sr no	Study	Sensitivity		Specificity		Positive predictive value		Negative predictive value		Diagnostic accuracy	
		FNA C	CNB	FNA C	CNB	FNA C	CNB	FNA C	CNB	FNA C	CNB
1	Our study	70.8 %	87.5 %	96.2 %	100 %	94.4 %	100 %	78.1 %	89.7 %	84%	94 %
2	Abhijit et al ³	69%	88.3 %	100%	100 %	100%	100 %	38.1 %	53.3 %	74%	86 %
3	Shashirekha et al ⁷	84.4 %	97.1 %	100%	100 %	100%	100 %	84.1 %	96.8 %	-	-

Conclusion:

Our study concluded that CNB has higher sensitivity, specificity, PPV, NPV, and diagnostic accuracy than FNAC and therefore more accurate than FNAC in diagnosing breast carcinoma. Additionally, CNB gives a pathological tissue diagnosis which is mandatory for staging, treatment, and prognosis of breast carcinoma as compared to FNAC which gives the only cytological diagnosis. Despite the ability of CNB to provide a more detailed histological diagnosis with additional details on the receptor status, tumor grade, and lymphovascular

invasion, FNAC is still useful as a simple, reliable, rapid, and economical method needing less advanced equipment and expertise in centers where facility for CNB is still not routinely available.

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