Role of FNAC and Core Needle Biopsy in the Diagnosis of Breast Lesions

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Abstract

Background: Though excision biopsy of breast lump is considered to be the gold standard method for diagnosis, there should be an improved and definitive method for establishing an accurate diagnosis of breast lesions prior to surgery. This study was carried out to evaluate the efficacy and diagnostic performance of fine needle aspiration cytology (FNAC) and core needle biopsy (CNB) in the preoperative assessment of breast lesions.

Methods: This cross-sectional study was conducted in the private diagnostic center in Rajshahi, Bangladesh over a period of one year from January 2022 to December 2022.A total of 60 cases were subjected to both FNAC and CNB from the same breast lesions included in this study.

Result: The age range of total 60 patients was 22-85 years with mean age of 42.18 ±SD 12.15 years. 38 patients had benign lesions and 22 had malignant tumors. Sensitivity, specificity, positive predictive value, negative predictive value, and diagnostic accuracy for FNAC were 89.4%, 100%, 100%, 84.6%, and 93.3%, respectively in diagnosing carcinoma. CNB had sensitivity, specificity, positive predictive value, negative predictive value, and diagnostic accuracy of 94.7%, 100%, 100%, 91.6% and 91.6% respectively. Both FNAC and CNB showed statistically significant association.

Conclusion: Taking into account the benefits and outcomes, combined approach of FNAC and CNB can provide accurate preoperative diagnosis of breast lesions and provide important information for appropriate treatment.

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Introduction

Breast cancer is the most frequent cancer among women and becoming the second most cancer in the world now a days. In 2012, about 1.67 million new cancer cases diagnosed in developing countries.[1] According to the study of world cancer report 2008, the number of new cases of breast cancer in the year 2008was 17,781 in Bangladesh.[2]

Fine-needle aspiration cytology (FNAC) and core needle biopsy (CNB) are the most widely used methods for pathological diagnosis of breast lesions. They play an important role in their management individually. Fine-needle aspiration cytology is a fast and simple routine procedure but it is a highly operator-dependent procedure and requires special training of the pathologist.[3] However, FNAC reports still have lack of important information about the histopathological type, grade, receptors status and intrinsic behavior of the tumor. All of this information is of great importance for correct preoperative evaluation by both surgeon and oncologist.[4] In such instances, core needle biopsy has been shown to be an excellent tool and fulfilled the limitations.

In case of palpable breast lesions, the core biopsy is based on the histological study of tissue specimens and provide reliable information to guide the surgeon. It also permits the evaluation of both the architectural and cytological pattern and provides the eventual use of new adjuvant therapy.[5]

Though FNAC is a less expensive, faster and widely used technique, the experience with CNB has improved considerably over FNAC. Some studies also criticize the use of FNAC as the only diagnostic test. Some authors recommended combining the two techniques.[6]

So, the purpose of the present study was to determine the value of both fine needle aspiration cytology and core needle biopsy in the pre-operative diagnosis of breast lesions and compare the results with each other taken from the same breast lesion by the same operator.

Methods

This cross-sectional study was conducted in the a private diagnostic center over a period of one year from January 2022 to December 2022.A total of 60 cases of different breast lesions were included in this study. A purposive method of sampling was employed.

With proper aseptic measures, fine needle aspiration was done by using a 5 cc or 10 cc disposable syringe for each puncture and for each patient and two to four smears were prepared in glass slides for each patient according to need. The core needle biopsy was performed by an automated biopsy device equipped with a 14 gauge needle having a sample notch of 15 mm in length. Samples were obtained from different areas of the lesion, usually from the center and close to the borders at the 3, 6, 9 and 12 O'clock positions and were placed in a vial containing 10% neutral buffered formalin.[7]

Statistical analysis was performed by using SPSS – version 25. The sensitivity, specificity, diagnostic accuracy, positive and negative predictive values of the test were computed. The level of significance was set at 5% andp-value < 0.05 was considered significant.

Result

A total of 60 cases of breast lesions were included in this study in which FNAC and CNB were performed subsequently followed by histopathology. It was observed that the majority of the patients belonged to the age group of 41-50 years. The mean age was

found 42.18 ± SD 12.15 years with the range from 22 to 85 years (Table – I). In FNAC out of 60 cases, majority of the cases (34 cases, 56.7%) were diagnosed as duct cell carcinoma (DCC). 4 cases were reported granuloma, 7 cases were fibroadenoma, 4 cases were diagnosed as a fibrocystic changes, 3 cases as chronic mastitis, proliferative breast disease (PBD) with atypia was diagnosed in 5 cases and 2 cases were breast abscess. In CNB, Out of 60 cases majority of the cases were diagnosed as DCC (36.3%), which was same as FNAC. 4 cases (24.1%) were reported granuloma which was also same as FNAC. 3 cases were as proliferative breast disease with atypia and one case was remained undiagnosed due to unsatisfactory tissue which was confirmed later by histopathology (Table – II). On FNAC 26 cases (43.3%) were reported as benign and 34 cases (56.7) were labeled to have malignancy (Table – III). Comparison of fine needle aspiration cytology and final diagnosis made on excision biopsy showed that four cases were erroneously diagnosed as benign on fine needle aspiration cytology whereas it was found to be malignant on excision biopsy (Table- III). Chi-square test was done and was highly Significant (P = 0.000). On core needle biopsy, 24 cases (40%) were reported as benign and 36 cases (60%) were diagnosed to have malignancy. Comparison of core needle biopsy and final diagnosis made on excision biopsy showed that two cases were erroneously diagnosed as benign on CNB whereas it was found to be malignant on excision biopsy (Table- IV). Chi-square test was done and was highly significant (P = 0.000). The validity of screening test was calculated by sensitivity, specificity and accuracy. The sensitivity of FNAC was 89.5 %. The specificity of FNAC was 100% and the accuracy rate was 94.7%. The sensitivity of core biopsy was 92.30%, specificity was 100% and accuracy rate was 96.6% (Table - V).

Table I: Distribution of study subject according to age group (n=60)

Age group	Frequency (n)	Percentage (%)
<30	09	15.0
31-40	22	36.7
41-50	16	26.7
51-60	11	18.3
≥61	02	03.3
Total	60	100.0

Range 22-85 years; Mean=42.18 ± 12.15 (SD)years

Table II: Distribution of different breast lesions (n=60)

Categories	FNAC n(%)	CNBn (%)
Benign:	26	24
• Granuloma	04	04
• Fibroadenoma	07	08
• FCD	04	03
• Chronic mastitis	03	03
• Abscess	02	02
• PBD with atypia	05	03
• Non- diagnosed	01	01
Malignant		
• DCC	34	36

Table III: Association between of FNAC diagnosis and histopathology (n=60)

FNAC diagnosis	Histopathological diagnosis		Total
	Malignant	Benign	
Malignant	34	00	34
Benign	04	22	26
Total	38	22	60

Chi-square significance: P = 0.000; highly significant

Table IV: Association between CNB diagnosis and histopathology (n=60)

CNB diagnosis	Histopathological diagnosis		Total
	Malignant	Benign	
Malignant	36	00	36
Benign	02	22	24
Total	38	22	60

Chi-square significance: P = 0.000; highly significant

Table V: Validity of FNAC and CNB diagnosis in respect to final diagnosis

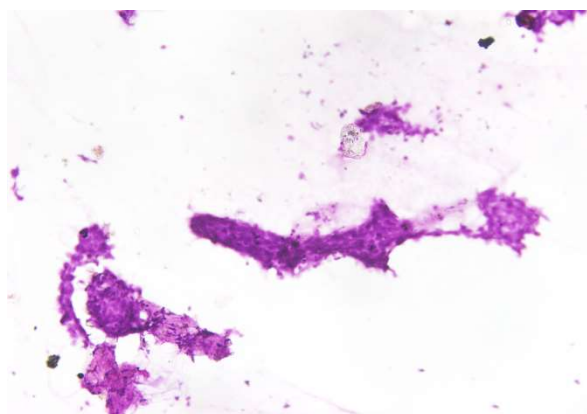| Validity test	FNAC	CNB
Sensitivity	89.5%	94.7%
Specificity	100%	100%
Positive predictive value	100%	100%
Negative predictive value	84.6%	91.6%
Diagnostic Accuracy	93.3%	96.6%

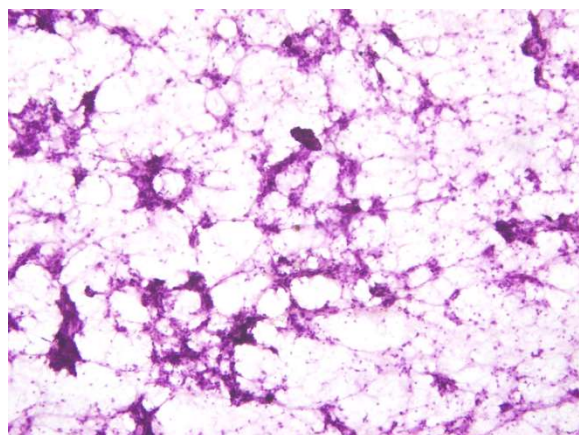Figure 3. Photomicrograph of a case of fibroadenoma on CNB (Case no 21, H & E stain, 40x).
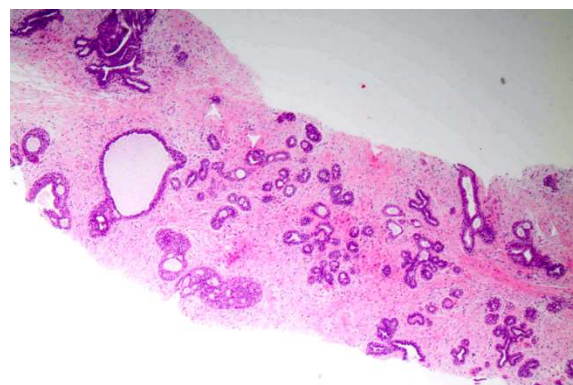

Figure 1. Photomicrograph of a case of fibroadenoma on FNAC (Case no 07, H & E stain, 400x).

Figure 4. Photomicrograph of a case of DCC on CNB (Case no 37, H & E stain, 40x).
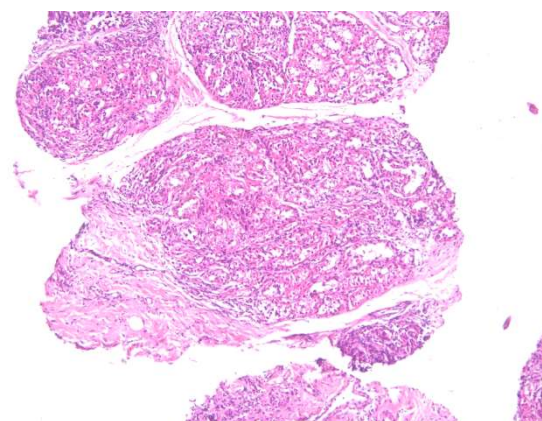

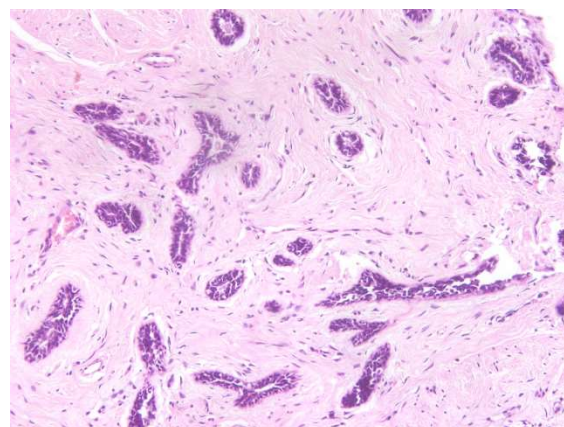Figure 2. Photomicrograph of a case of DCC on FNAC (Case no 48, H & E stain, 100x).

Figure 5. Photomicrograph of a case of fibroadenoma on Histopathology (Case no 51, H & E stain, 100x).
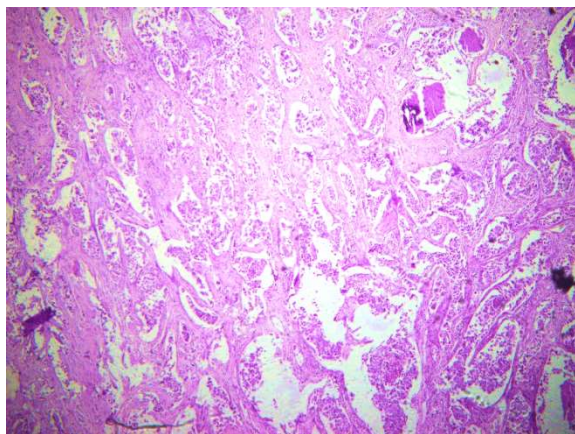
Figure 6. Photomicrograph of a case of DCC on Histopathology (Case no 24, H & E stain, 100x).

Discussion

FNAC and CNB represent the complementary procedures for preoperative diagnosis of breast lesions, both with their specific advantages and limitations. The aim of this current study was to explore the value of performing both FNAC and CNB in the preoperative assessment of breast lesions.

In our study, total 60 cases of different breast lesions were included. Age range was 22-85 years. Mean age was 42.18 ± SD 12.15 years which was quite similar to RahmanMZ et al (37.41 years).[6] This result was dissimilar to another studies conducted by Hatada et al reported a mean age of 52 years, Yong et al reported a mean age of 57 years and mean age of 60 years was reported by Agarwal et al.[8-10] Carcinoma was most commonly diagnosed in the age group of 41- 50 years in this current study which was similar to the study by Khemka et al, expressed that the peakincidence of breast carcinoma was between 40-44 years.[11]

In our experience, comparable results for FNAC and CNB were obtained in terms of sensitivity (89.4% vs 94.7%), specificity (100% vs 100%), diagnostic accuracy (93.3% vs 96.6%) and NPV (84.6% vs 91.6%). A

higher NPV is important for any diagnostic procedure to minimize under-treatment which was achieved by CNB.

Fewer comparison studies of similar nature conducted by Homesh et al, Usami et al, to compare validity of CNB & FNAC had reported very high sensitivity (91-99%), specificity (96-100%), positive predictive value (100%), and negative predictive value (100%) for CNB which were quite better than results for FNAC for both palpable and non-palpable lesions. In our study sensitivity, diagnostic accuracy and NPV were higher in case of CNB; specificity and PPV were same for both the procedures.[12,13]

All four false negative cases in FNAC belonged to proliferative breast disease with atypia group. The false negative results of FNAC were mainly due to underestimation of cellular atypia. On the other hand, there were two false negative cases in CNB due to unsatisfactory tissue materials. The false negative rate in CNB was 3.33% which is lower than the rate in FNAC (6.66%). The treatment of breast cancer may be delayed by a false negative diagnosis. The CNB reduced the false negative rate by 50 % (6.66% to 3.33%), in comparison to FNAC. This result was almost similar to Sharmin S et al.[7]

Conclusion
The diagnosis of breast lesions is usually accomplished by triple assessment (surgeon, radiologist and pathologist) in a multidisciplinary setting. FNAC and CNB are the most commonly used diagnostic modalities in the histological diagnosis of breast lesions. To minimize the limitation of each test individually, the aim of the study was to diagnose all the breast lesions confidently and not a single case should be missed. The accuracy of CNB is superior to FNAC regarding sensitivity and NPV. So to increase the sensitivity and to reduce the

numbers of false negative, combined approach are helpful

References

1. Ferlay J, Soerjomataram I, Dikshit R et al. Cancer incidence and mortality worldwide: sources, methods and major patterns in GLOBOCAN 2012. International journal of cancer. 2015 Mar 1;136(5):E359-86.
2. Boyle P, Levin B. World cancer report 2008. IARC Press, International Agency for Research on Cancer. 2008 Dec 31; 1-510.
3. Westenend PJ, Sever AR, Beekman-de Volder HJ, Liem SJ. A comparison of aspiration cytology and core needle biopsy in the evaluation of breast lesions. Cancer Cytopathology. 2001 Apr 25;93(2):146-50.
4. Bdour M, Hourani S, Mefleh W et al. Comparison between fine needle aspiration cytology and tru-cut biopsy in the diagnosis of breast cancer. J Surg Pak (Int). 2008 Jan;13(1):19-21.
5. Caruso ML, Gabrieli G, Marzullo G, Pirrelli M, Rizzi E, Sorino F. Core biopsy as alternative to fine-needle aspiration biopsy in diagnosis of breast tumors. The Oncologist. 1998 Feb;3(1):45-9.
6. Rahman MZ, Das NC, Siddiqui SR,Sultana N, Hossain I,Jahan I. Comparison between Fine Needle Aspiration Cytology (FNAC) and Core Needle Biopsy (CNB) in the diagnosis of breast lesions. Journal of Histopathology and Cytopathology. 2019 Jan; 3 (1):38-44
7. Sharmin S, Dewan MR, Jinnah SA et al. Concurrent Core Needle Biopsy with Fine Needle Aspiration Biopsy in The Diagnosis of Palpable and Clinically Suspicious Breast Lesions. Journal of Histopathology and Cytopathology. 2019 Jul; 3 (2):107-116.
8. Hatada T, Ishii H, Ichii S, Okada K, Fujiwara Y, Yamamura T. Diagnostic value of ultrasound-guided fine-needle aspiration biopsy, core-needle biopsy, and evaluation of combined use in the diagnosis of breast lesions. Journal of the American College of Surgeons. 2000 Mar 1;190(3):299-303.
9. Yong WS, Chia KH, Poh WT, Wong CY. A comparison of trucut biopsy with fine needle aspiration cytology in the diagnosis of breast cancer. Singapore medical journal. 1999 Sep 1;40(9):587-9.
10. Agarwal T, Patel B, Rajan P, Cunningham DA, Darzi A, Hadjiminas DJ. Core biopsy versus FNAC for palpable breast cancers. Is image guidance necessary? European Journal of Cancer. 2003 Jan 1;39(1):52-6.
11. Khemka A, Chakrabarti A, Shah S, Patel V. Palpable breast lumps; Fine Needle Aspiration Cytology versus histopathology: A Correlation Of Diagnostic Accuracy. The Internet Journal of Surgery. 2009;18:1-13.
12. Homesh NA, Issa MA, El-Sofiani HA. The diagnostic accuracy of fine needle aspiration cytology versus core needle biopsy for palpable breast lump (s). Saudi medical journal. 2005 Jan 1;26(1):42-6.
13. Usami S, Moriya T, Kasajima A, Suzuki A, Ishida T, Sasano H, Ohuchi N. Pathological aspects of core needle biopsy for non-palpable breast lesions. Breast Cancer. 2005 Oct;12:272-8.