IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)
e-ISSN: 2279-0853, p-ISSN: 2279-0861.Volume 19, Issue 1 Ser.18 (January. 2020), PP 50-54
www.iosrjournals.org

A clinicopathological study on diagnostic efficacy of FNAC, Cellblock and Core-needle biopsy in diagnosing breast carcinomas

Runjun Sonowal[1], Indranil Chakrabarti[2], Joydeb Singha[3], Mamata Guha Mallick Sinha[4]

[1]*Consultant Pathologist, BS Diagnostic Centre, Siliguri, Darjeeling,West Bengal*
[2]*Associate Professor, Department of Pathology,*
North Bengal Medical College, Siliguri, Darjeeling, West Bengal
[3]*Associate Consultant, Neotia Getwel Healthcare Centre, Siliguri, Darjeeling, West Bengal*
[4]*Professor, Department of Pathology, IPGMER and SSKM Hospital, Kolkata, West Bengal*

Corresponding Author: Indranil Chakrabarti

Abstract:
Introduction: *The health care burden related to breast carcinoma has been steadily mounting and has become one of the leading cause of death among women in the world . Cell block study has emerged as a reproducible method for diagnosing breast carcinomas while core needle biopsy is becoming increasingly popular. The purpose of the study was to evaluate the diagnostic efficacy of various types of breast carcinomas by FNAC, cell block preparations and core-needle biopsy (CNB).*
Materials and Methods: *In 60 patients with a clinical suspicion of breast carcinoma, fine needle aspirations, cell block and core needle biopsy were carried out using standard technique and were evaluated by observational study with cross sectional design. The excision biopsy was taken as the gold standard of diagnosis.*
Results: *Out of 60 cases, diagnostic accuracy of FNAC, Cell Block and CNB were 93%, 95% and 96% respectively.*
Conclusions: *Cell block technique accurately compare well with the histology with the added advantage of being simple and reliable . The contribution of cell blocks to the final cytologic diagnosis supports the view that cell blocks should be considered in all fine-needle aspirations whenever possible.*

Keywords: *FNAC, Cell block, Core needle biopsy , Breast carcinoma.*

Date of Submission: 14-01-2020 Date of Acceptance: 30-01-2020

I. Introduction:

Breast cancer is the most common invasive malignancy in women worldwide.[1] Prevention and early diagnosis of breast cancer are implemented and awareness of breast self-examination and mammographic screening programs are the most urgent issues. The most accepted protocol followed for diagnosis of breast lumps is "Triple assessment" which includes clinical assessment, radiological assessment and cytopathological diagnosis.[2] FNAC of the breast is an effective tool to identify breast cancers allowing definitive treatment.[3] A definite diagnosis on the basis of a core biopsy is possible in over 90% of cases.[4] However, some studies have shown limitations of FNAC and Core needle biopsy.[5,6] Cell block has emerged as a complementary tool to cytological assessment in many anatomical sites.[7] Therefore the present study was carried out to evaluate the diagnostic efficacy of FNAC, cell block and core-needle biopsy in diagnosing breast carcinomas taking excision biopsy as gold standard.

II. Materials And Methods :

The observational and cross sectional study was performed at North Bengal Medical College, a rural tertiary medical college and hospital in West Bengal, India, over a period of 1 year from April 2015 to March 2016 after obtaining ethical clearance . The clinically suspected cases of breast carcinomas were taken in the study in which subsequent excisional biopsy could be obtained. Materials were aspirated from breast lump by multiple passes during FNAC procedure [8] to obtain adequate yield and and were stained by Leishman and Giemsa stain (air dried smears) and Hematoxylin and Eosin (H&E) stain (alcohol fixed smears). The remaining

material in the aspirated syringe and needle hub were collected and preserved in 10% Normal Buffer Formalin for cell block preparation by plasma-thrombin clot method [9]. Core biopsy Needle (14G) was introduced inside the lesion and 4 to 5 cores were taken and released in the bottle containing 10% formalin and send for tissue processing[10]. Image guidance was taken whenever necessary. Immunohistochemical staining [Estrogen receptor (ER), Progesterone receptor (PR), HER2/neu] were done by labeled Horse Radish Peroxidase (HRP) polymer technique[11] on cell blocks and core needle biopsy specimens. Collected data was entered in Microsoft Excel data sheet . Diagnostic efficacy of FNAC, Cellblock and Core Needle biopsy in diagnosing of breast carcinomas were analysed using histopathology of excisional biopsy as gold standard.

III. Results:

The present study included 60 cases of clinically suspected cases of breast carcinoma with maximum cases occurring in the age group of 41 to 50 years. All the patients were females. 10 (16.6 %) cases of females were nulliparous while 15 (25%) cases had no history of breast feeding. 20 (33.3%) cases were postmenopausal. Most common clinical presentation was breast lump , occurring most commonly on the left side and on upper outer quadrant. Palpable axillary lymph nodes of same side were seen in 30 cases. The results obtained were categorized according to the standard NHSBSP criteria (National Health Service Breast Screening Programme) and were analyzed using excision biopsy as gold standard as shown in [Table 1]. On evaluation of the cases of breast carcinoma [Table 2,3,4] 46 cases of FNAC , 47 cases of Cell Block and 48 cases of Core needle biopsy were Malignant. 4 cases of FNAC, 3 cases of cell block and 2 cases of Core needle biopsy were categorized as Suspicious of malignancy (C4) which were diagnosed as malignant on subsequent excision biopsy. On excision biopsy all cases were of invasive ductal carcinoma. In our study, [Table 5] sensitivity , specificity, positive predictive value , negative predictive value , false negative diagnostic accuracy of FNAC were 92%, 100 %, 100%, 71%, 8% and 93% respectively. In cell block, [Table 6] sensitivity , specificity, positive predictive value , negative predictive value , false negative and diagnostic accuracy of cell block were 94%, 100%, 100 %,76%, 6% and 95% respectively. In core needle biopsy [Table 7] sensitivity , specificity , false negative , positive predictive value , negative predictive value, diagnostic accuracy were 96%, 100%, 100%, 83%, 4% and 96% respectively. Core needle biopsy showed highest diagnostic accuracy (96%) but it is also seen that cell block fared accurately well with histology with a diagnostic accuracy of 95% and a p-value <0.05. Expression of hormone receptor was studied on cell block and core needle biopsy using two-group classification as positive and negative expression. In our study, [Table 8] ER expression 90%, PR Expression 80% and HER2/neu 80% were noted in cell blocks which showed good correlation with core needle biopsy expression of ER (92%), PR (84%) and HER/ 2neu (82%).

IV. Discussion :

Global burden of breast cancer is expected to cross 2 million by the year 2030 with growing population from developing countries.[12] Fine-needle aspiration (FNA) is simple, cost effective method for diagnosing palpable breast lesions. A study of 2,375 lesions of breast by FNAC conducted by Chaiwun et al[13] , sensitivity**,** specificity, positive predictive value, negative predictive values were 84.4%**,** 99.5%, 99.8%, and 84.3%, respectively; overall diagnostic accuracy was 91.3%; false-positive and false-negative rates were 0.5% and 16.7%, respectively which correlates with our study . Some aspirates show mucin like material which mimics mucinous (colloid) carcinoma.[14] Other limitations of FNAC include high cases of false negative , poor spreading, air drying artifact, inability to distinguish between DCIS and invasive carcinoma.[5,15] Diagnosis of sclerosing lesions, papillary lesions and low-grade carcinomas like tubular carcinoma and lobular carcinoma are also difficult to diagnose on FNAC. The introduction of the cell block technique has increased the diagnostic accuracy of FNAB. Keyhani-Rofaga et al reported that in a study of 85 cases, 55% of the original smear diagnosis were improved after the cell block was examined. [16] The sensitivity of cell blocks varies from 60% to 86% depending on the sample size and type of specimen.[17] Cell blocks help in good morphologic interpretation, cell pattern and minimize background stain and numerous sections can be obtained from a single sample[18] . In another study by S. Basnet and O. P. Talwar, 3 cases suspicious for malignancy on FNAC were confirmed to be invasive ductal carcinoma with cell block[19] which correlated with our study. In a study of 62 breast carcinomas, Hegazy et al inferred that combining FNAC with the cell block can also combine the advantages of both the approach and also reduce the false negative results.[20] Combining FNAC and Core Needle biopsies has also shown to increase the diagnostic accuracy[21]. Studies have shown that the sensitivity, specificity, the predictive value of a positive result and diagnostic efficiency of core biopsy were 92% (67/73), 100%, 100%, and 86% respectively[22] which correlate with our findings. CNB has a few disadvantages like it needs a radiologist or a clinician, it is somewhat more invasive, complications such as bleeding, infections and pneumothorax are possible though not common and malignant seeding of the tumor in the needle tract may occur. [5,23,24] Added to this there is increased turn around time (TAT) and the procedure may not be suitable or helpful in cystic and mucinous lesions. The hormone receptor status of breast carcinoma can predict the

response to adjuvant endocrine therapy. Good immunostaining assessment of ER, PR, and HER2 determination on FNA-acquired cell block showed excellent agreement for ER and HER2 and moderate agreement for PR with the corresponding tissue block[21] which correlate with our study . Thus this study describes the diagnostic accuracy of cell blocks in diagnosing breast carcinoma. We recommend cell blocks should be a part of cytopathological diagnosis.

V. Conclusion:

The present study included 60 cases of clinically suspected cases of breast carcinoma attending the Department of Pathology , North Bengal Medical College & Hospital. Diagnostic accuracy of FNAC, cellblock, core Needle biopsy were comparable when matched against the gold standard of excisional biopsy. Cell block technique correlated well with the histology with the added advantage of being simple, reliable and rapid. The contribution of cell blocks to the final cytologic diagnosis supports the view that cell blocks should be considered in all fine-needle aspiration specimens whenever possible.

References

[1]. Lester SC . The breast . In KumarV, Abbas AK, Aster JC , Robbins and Cotran Pathologic Basis of Disease , South asia edition. New Delhi, Reed Elsevier India Private Limited Publishers,2014; 1043-70.
[2]. Chlebowski RT, Andreson GL, Lance D, Zoppi JK, Patel S. Estrogen plus progestin and breast cancer incidence and mortality in post menopausal women.JAMA. 2010, 304 (15): 1131-6.
[3]. S. Mizuno, S. Isaji, T. Ogawa, M. Tabata, K. Yamagiwa, H. Yokoi, and S. Uemoto, Approach to fine-needle aspiration cytology-negative cases of breast cancer. Asian J Surg 2005(2):13–17.
[4]. Collins LC, Connolly JL, Page DL, Goulart RA, Pisano ED, Fajardo LL et al : Diagnostic agreement in the evaluation of image-guided breast core needle biopsies: results from a randomized clinical trial. Am J Surg Pathol 2004; 28:126-31.
[5]. Silverman JF, Masood S, Ducatman BS, Wang HH, SneigeN. Can FNA biopsy separate atypical hyperplasia, carcinoma in situ, and invasive carcinoma of the breast? Cytomorpho-logic criteria and limitations in diagnosis. Diagn Cytopathol 1993;9:713– 28.
[6]. Sadler GP, McGee S, Dallimore NS, Monypenny IJ, Douglas-Jones AG, Lyons K et al. Role of fine-needle aspiration cytology and needle-core biopsy in the diagnosis of lobular carcinoma of the breast. Br J Surg 1994;81:1315–7.
[7]. Orell SR, Sterrett GF, Walters MNI, et al: Manual and atlas of fine needle aspiration cytology,ed 3. London, Churchill Livingstone,1999, pp 267–90.
[8]. Frable WJ. Needle aspiration of the breast Cancer. 1984;53:671-6
[9]. Bales CE, Durfee GR. Cytological technique, part 1. In: Koss LG, ed. Diagnostic Cytology and Its Histopathologic Bases. 4th ed. Philadelphia, PA: Lippincott; 1992:1451- 74
[10]. Bishop J, Coleman M, Cooke B, Davies R, Frost F, Grace J et al .National breast cancer centre. Breast FNAcytology and core biopsy : A guide to practice .1st ed.Camperdown: National Breast Cancer Centre ; 2004.
[11]. Miller K.Immunocytochemical Techniques.In: John D Bancroft. Theory and Practical of Histology Techniques,5th Edition. Philadelphia,Churchill Livingstone 2002;439-48.
[12]. Jemal A, Bray F, Center MM, Ferlay J, Ward E, Forman D. Global cancer statistics .CA Cancer J Clin 2011; 61(2): 69-90.
[13]. Chaiwun B, Settakorn J, Ya-In C, Wisedmongkol W, Rangdaeng S, Thorner P. Effectiveness of fine-needle aspiration cytology of breast: analysis of 2,375 cases from northern Thailand. Diagn Cytopathol. 2002;26(3):201–5.
[14]. Simsir A, Tsang P, Greenebaum E. Additional mimics of mucinous mammary carcinoma: fibroepithelial lesions. Am J Clin Pathol. 1998;109(2):169–72.
[15]. Orell SR. Manual and atlas of fine needle aspiration cytology(FNAC).Churchill Livingstone Newyork.1992.pp.96
[16]. Keyhani-Rofaga S, O'Toole RV, Leming MF. Role of the cell block in fine-needle aspirations. Acta Cytol 1984;28:630-1.
[17]. Bidgoli SA, Ahmadi R, Zavarhei MD. Role of hormonal and environmental factors on early incidence of breast cancer in Iran. Sci Total Environ. 2010;408:4056–61.
[18]. Geisinger KR, Raab S, Stanley MW, Silverman JF . Modern Cytopathology .1 st edition, Churchill Livingstone ;2004
[19]. Basnet S, Talwar OP. Role of cell block preparation in neoplastic lesions. Journal of Pathology of Nepal 2002: 2(4):272–76.
[20]. Hegazy RA, Hegazy A, Fetouh FA, Ibrahim S. Fine needle aspiration cytology and cell block study of various breast lump . American Journal of Biomedical and Life Sciences 2014;.2(1): 8-17.
[21]. Liao J, Davey DD, Warren G, Davis J, Moore AR, Samayoa LM. Ultrasound- guided fine-needle aspiration biopsy remains a valid approach in the evaluation of nonpalpable breast lesions. Diagn Cytopathol 2004;30(5): 325-31
[22]. Caruso ML, Gabrieli G, Marzullo M, Pirrelli E, Rizzi F, Sorino F. Core Biopsy as Alternative to Fine-Needle Aspiration Biopsy in Diagnosis of Breast Tumors . The Oncologist 1998;3:45-9 .
[23]. Kline TS, Kannan V, Kline IK. Apprasial and cytomorphologic analysis of common carcinomas of the breast. Diagn Cytopathol 1985;1:188–93.
[24]. Sadler GP, McGee S, Dallimore NS, Monypenny IJ, Douglas-Jones AG, Lyons K, et al. Role of fine-needle aspiration cytol ogy and needle-core biopsy in the diagnosis of lobular carcinoma of the breast. Br J Surg 1994;81:1315–7.

Tables

Table 1: NHSBSP for cytology reporting and core biopsy reporting :

Cytology Reporting		Core Biopsy reporting	
C1	Unsatisfactory	B1	Unsatisfactory
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

Table 2: Distribution of patients according to different cytological categories as assessed by FNAC:

Category	C2	C3	C4	C5	Total
No. of patients	0	0	14	46	60
Relative percentage	0%	0%	28%	92%	100%

Table 3: Distribution of patients according to different cytological categories as assessed by Cell block :

					Total
Category	C2	C3	C4	C5	
No. of patients	0	0	13	47	60
Relative percentage	0%	0%	21%	94%	100%

Table 4: Distribution of patients according to different CNB categories

Category	B2	B3	B4	B5	Total
No. of patients	0	0	12	48	60
Relative percentage	0%	0%	20%	96%	100%

Table 5: Distribution of all patients as per their final diagnostic category :

		Diagnostic histopathology		Total
		Malignancy diagnosed	Malignancy non diagnosed	
FNAC	Malignancy diagnosed (C5)	46 (TP)	0 (FP)	46
	Malignancy non diagnosed (C3 +C4)	04 (FN)	10 (TN)	14

Table 6: Distribution of all patients as per their final diagnostic category :

		Diagnostic histopathology		Total
		Malignancy diagnosed	Malignancy non diagnosed	
Cell Block	Malignancy diagnosed (C5)	47 (TP)	0 (FP)	47
	Malignancy non diagnosed (C3 +C4)	03 (FN)	10(TN)	13

Table 7: Distribution of all patients as per their final diagnostic category :

		Diagnostic histopathology		Total
		Malignancy diagnosed	Malignancy non diagnosed	
CNB	Malignancy diagnosed (B5)	48 (TP)	0(FP)	48
	Malignancy non diagnosed (B3 +B4)	02 (FN)	10 (TN)	12

Table 8: Expression of IHC between cell block and CNB

	CELL BLOCK			CORE NEEDLE BIOPSY (CNB)		
RESULT	ER	PR	HER2/neu	ER	PR	HER2/neu
POSITIVE	45 (90%)	40(80%)	41(80%)	46 (92%)	42 (84 %)	41(82%)
NEGATIVE	05(10%)	10 (20%)	09 (18%)	04(8%)	08 (12%)	09(18%)
TOTAL	50	50	50	50	50	50

Figures

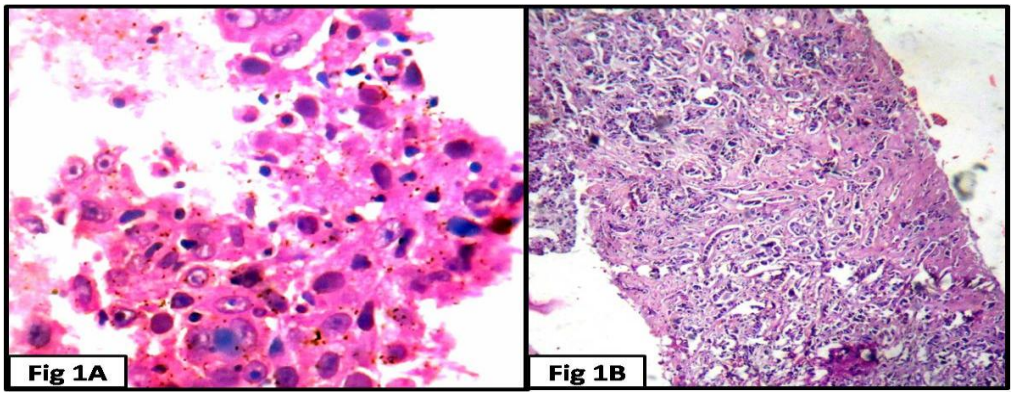

Figure 1: A) showing cell block preparation of ductal carcinoma (H&E stain ; X400 magnification)B) showing CNB of the same case ((H&E stain ; X100 magnification)

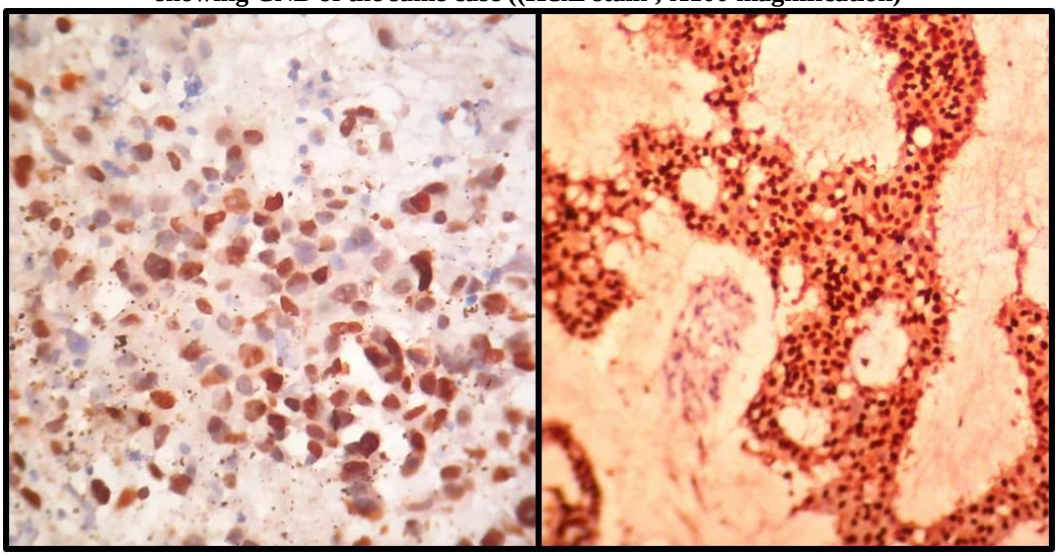

Figure 2: A) IHC for Estrogen receptors (ER) in cell block preparation of ductal carcinoma of breast showing nuclear positivity (X400 magnification)
B) IHC for ER in the CNB of the same case (X100 magnification)

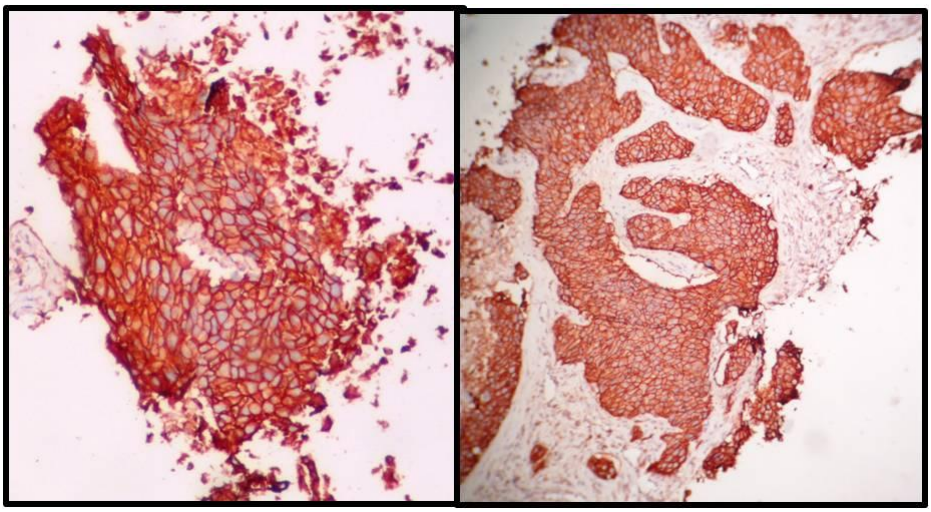

Figure 3: A) IHC for HER2/neu in cell block preparation of ductal carcinoma of breast showing membranous positivity (X100 magnification)
B) IHC for HER2/neu in the CNB of the same case (X100 magnification)