Original Article

Comparative study of aspiration and non-aspiration cytology of palpable breast lumps and correlation with histopathology

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ABSTRACT

Background: Breast lump is one of the most common presentations in surgical outpatient departments with anxiety regarding a possible malignancy. Hence a quick diagnosis of a lump in the breast is essential. Fine needle aspiration cytology is an ideal initial diagnostic modality in breast lumps. There is an alternative method of performing needle aspiration, known as fine needle capillary cytology where the specimen is obtained using just a needle without aspiration.

Materials and Methods: This hospital-based cross sectional analytical study was carried out in Department of Pathology in National Academy of Medical Sciences, Bir Hospital for one year. The objective of this study was to compare aspiration and non-aspiration cytology of palpable breast lumps and correlation with histopathology.

Results: The five criteria scored for each technique were background blood, amount of cellular material, cellular degeneration, cellular trauma and architectural preservation. Compared to fine needle aspiration cytology, fine needle capillary cytology yields less bloody smears with minimal degenerative changes and offers more diagnostically superior specimens. Fine needle aspiration cytology, on the other hand, gives a good yield of diagnostic material.

Conclusion: Fine needle aspiration cytology and fine needle capillary cytology are quick, easy, safe and cost-effective techniques. . A high sensitivity and specificity of cytological diagnosis in this study proves that it is comparable to final histology report in its diagnostic efficiency. Thus, fine needle aspiration cytology is a very important preliminary diagnostic test in palpable breast lumps and the results show a high degree of correlation with the final histopathology report.

INTRODUCTION

Breast disease in women encompasses a spectrum of benign and malignant disorders. With growing awareness in the general population, especially about breast pathologies, a lady with a breast lump is one of the most common presentations in surgical outpatient departments with anxiety regarding a possible malignancy. Considering patients' comfort, lack of requirement of anesthesia, rapid analysis and reporting, and few false positive results, fine needle aspiration cytology (FNAC) is an ideal initial diagnostic modality in breast lumps.[1] It is a popular technique used in the evaluation of breast masses due to its advantages of being sensitive, specific, simple, economical, safe, quick and acceptable to the patients.[2]

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The average sensitivity is approximately 87%, the specificity close to 100% and the predictive value of positive diagnosis nearly 100% and the predictive value of a negative diagnosis between 60% and 90%.

Recently the technique of fine needle sampling without aspiration, also known as fine needle capillary cytology (FNCC) has often been used to obtain cytological samples. It was developed in France in 1982 by Brifford et al.[3]

In the classical aspiration technique, the trauma caused to the tissue by the negative pressure created in the syringe is partly responsible for blood staining. This could contribute to cell distortion affecting the quality of the smears. In contrast, the non-aspiration-needle-jab technique collects cells by the cutting and scraping effect of the advancing tip without negative pressure.

Although the research work done in this field in different countries dates back to the last decade, this study was chosen because it would be beneficial to determine the usefulness of this procedure in our setup.

MATERIALS AND METHODS

This hospital-based cross sectional analytical study was carried out in Department of Pathology, National Academy of Medical Sciences, Bir Hospital for a total duration of 12 months from November 2011 to October 2012.

Initial data was obtained by history taking and clinical examination along with radiological features. Cytology samples were obtained by FNCC (25G) followed by FNAC (21G) performed on each patient respectively. For each smear prepared by FNAC and FNCC Papanicolaou staining was done on the alcohol fixed smears and Giemsa staining was done on the air dried smears. All samples were subjected to a point allocation scoring system, to evaluate their adequacy for cytodiagnosis before issuing a cytology report. Histopathological examination of breast specimen was done after routine fixation, processing and H & E staining.

All the samples were subjected to examination according to the methodology described and scored per the scoring system by Mair et al.[4] After assigning the appropriate scores, the cases were divided into 3 categories, which consisted of "diagnostically superior" (score 7-10), "diagnostically adequate" (score 3-6), " diagnostically unsuitable" (score 0-2). Cytology results were then correlated with histopathology.

All the data was entered into Microsoft Excel XP. The result was analyzed by SPSS program and appropriate statistical test was applied. P value was calculated under the predetermined level of significance (0.05).

RESULTS

In this study 45 patients with clinically palpable breast lumps underwent FNCC followed by FNAC. All 45 breast lesions were subsequently operated or biopsied. Out of the 45 cases 30 cases were benign breast lesions. Remaining 15 cases were malignant cases, out of which, 10 had mastectomy and 5 had lumpectomy.

There were 40 (88.9%) females and 5 males (11.1%) with a female-to-male ratio of 8:1. The age ranged from 15-67 years with a mean age of 36.2 years. Breast lesions were more common in age group 15-24 years (33.3%) followed by 35-44 (20.0%) and 55-64 years (15.6%) respectively. According to the site of involvement in breast, the lesions were more common in upper outer quadrant (46.7%) followed by upper inner quadrant (22.2%) and central region (22.2%) respectively.

Background blood was more in the FNAC smears than the FNCC smears. The amount of cellular material obtained was more by FNAC as compared to FNCC. Regarding degree of cellular degeneration and cellular trauma, both the criteria had higher scores by FNCC than FNAC indicating that cellular degeneration and cellular trauma are less by non-aspiration technique. For the retention of architecture FNCC scored higher than FNAC. (fig. 1&2)

When all the parameters were compared, FNCC scored higher 342 (Mean=7.60) than FNAC with a score of 305 (Mean=6.56). This difference was statistically significant (P-value=0.423). (Table 1)

Adequacy for diagnosis was assessed for both the techniques and is shown in table 2. More diagnostically superior (Score 7-10) smears were obtained by FNCC (33 cases) compared to FNAC (26 cases). Smears which were adequate for diagnosis (Score 3-6) were more by FNAC (17 cases) compared to FNCC (10 cases).

For all the 45 cases included in the study diagnosis was made by cytology and the cases were categorized into 5 categories. There were 30 cases of C2 category (66.7%)

Table 1: Total and mean scores for FNCC and FNAC

Criteria	FNCC scores		FNAC scores		P-value
	Total	Mean	Total	Mean	
Background blood	70	1.56	52	0.98	0.468
Cellular material	61	1.36	78	1.73	0.898
Cellular degeneration	69	1.53	52	1.16	0.307
Cellular trauma	70	1.56	55	1.18	0.258
Architectural preservation	72	1.60	68	1.51	0.029
Cumulative score	**342**	**7.60**	**305**	**6.56**	**0.423**

Table 2: Total number of cases in each of the diagnostic categories

Adequacy for diagnosis	FNCC	Percent	FNAC	Percent
Diagnostically superior (7-10)	33	73.3	26	57.8
Adequate for diagnosis (3-6)	10	22.2	17	37.8
Unsuitable for diagnosis (0-2)	2	4.4	2	4.4
Total	**45**	**100.0**	**45**	**100.0**

Table 3: Histological diagnosis of breast lumps

Diseases		Frequency	%
Malignant	Invasive Ductal Carcinoma	13	28.8
	Mixed Carcinoma (Ductal and Lobular)	2	4.4
Total		**15**	**33.3**
Benign	Fibroadenoma	20	44.4
	Fibroadenoma with fibrocystic change	4	8.8
	Gynaecomastia	4	8.8
	Fibrocystic change	2	4.4
Total		**30**	**66.7**
Grand Total		**45**	**100**

Table 5: FNAC versus Histopathology (n=45)

Number of patients	FNAC	Histopathology Results	
	33	Benign (n=30)	Malignant (n=15)
0	C1	0	0
30	C2	30	0
0	C3	0	0
8	C4	0	8
7	C5	0	7

i.e., benign lesions, 8 cases of C4 category (17.8%) i.e., suspicious for malignancy and 7 cases of C5 category (15.6%) i.e., malignant lesion. In histopathology out of 45 breast lesions thirty were benign (33.30%) and fifteen were malignant (67.70%). Table 3.

According to the histopathology results fibroadenoma was the most common benign lesion which accounted for 44.4% of total benign lesions and invasive ductal carcinoma was the most common malignant lesion (28.8%).

DISCUSSION

The expected and significant role of cytological diagnosis is to distinguish benign from malignant processes. FNAC of the breast has two main goals. One is to confirm a radiological and clinical benign lesion and avoid unnecessary surgery and the other is to confirm a malignant diagnosis and allow definite treatment planning.[5]

In this study, the procedures of FNCC followed by FNAC were performed in a total of 45 patients with palpable breast lumps. All 45 cases were subsequently analyzed histologically. Cytohistological correlation was done in all cases. All the samples obtained for the 45 cases were analyzed cytologically based on the quality scoring system proposed by Mair et al.[4] FNCC had scored higher than FNAC in regard to background blood or clot, degree of cellular degeneration and cellular trauma.

FNCC sampling in the study group had yielded material that was less contaminated by blood as compared to FNAC and this finding is consistent with the majority of authors who had done similar comparative studies. It has been suggested that FNCC sampling, by eliminating the negative

suction pressure employed in FNAC, decreases the dilution of cells by blood and the scientific basis was explained by Santos and Lieman in 1988 in thyroid lesions. They explained that the basic principle underlying fine needle aspiration (FNA) is the aspiration of cellular material from target masses, often utilizing fairly high suction pressures. This method relies on the property of capillary tension in the narrow channel. A new technique pioneered in France but essentially unpublicized, eliminates active aspiration, replacing it by the principle of capillary suction of fluid or semi-fluid material into a thin channel of fine needle.[6]

Other authors who had used the same scoring system have also reported the consistent finding of less haemorrhage in FNCC technique.[3] The amount of cellular material obtained was more by FNAC as compared to FNCC and the difference was statistically significant. The total scores for FNAC and FNCC were 78 (Mean=1.73) and 68 (Mean=1.36) respectively. Regarding degree of cellular degeneration and cellular trauma, both the criteria had higher scores by FNCC than FNAC indicating that cellular degeneration and cellular trauma are less by non-aspiration technique. For cellular degeneration the total score by FNCC was 69 (Mean=1.53), and for FNAC it was 52 (Mean=1.16). For cellular trauma the score for FNCC was 70 (Mean=1.56) and for FNAC, 55 (Mean=1.18). For retention of architecture FNCC scored 72 (Mean=1.60) and FNAC scored 68 (Mean=1.51). This difference was not statistically significant.

Raghuveer et al. had obtained a similar result in the prospective study of 200 patients with superficial swelling of various sites when FNCC procedure was followed by FNAC.[7]

The less amount of cellular material obtained by FNCC can be explained by the fact that suction aspiration plays an important role during needle aspirations. Haseler LJ[8] has explained that needle aspiration material yield depends on many implications such as syringe and needle size, vacuum generation, hand force requirements and needle control.

In this study more diagnostically superior smears were obtained by FNCC (73.3%) compared to FNAC (57.8%), while more diagnostically adequate smears were obtained by FNAC (37.8%) as compared to FNCC (22.2%). Similar
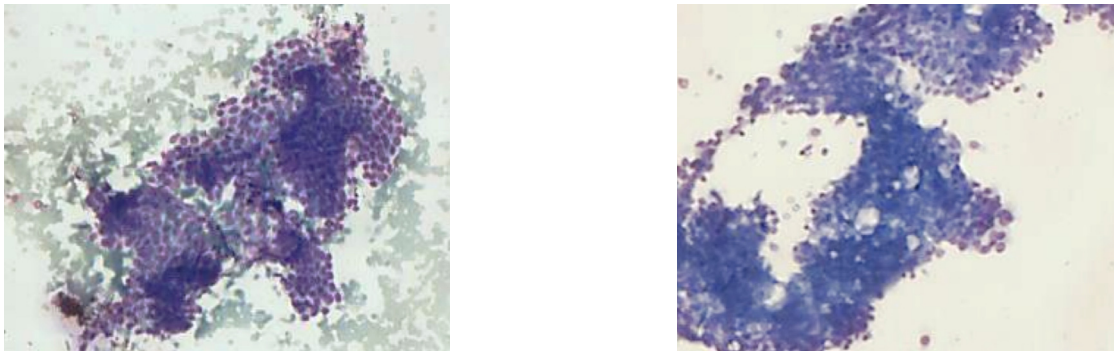
Figure 1: *Photomicrograph showing monolayered sheets of ductal epithelial cells in FNAC smear (a) and FNCC smear (b). Note the bloody background in FNAC and clean background in FNCC smear. (Giemsa stain, X100)*
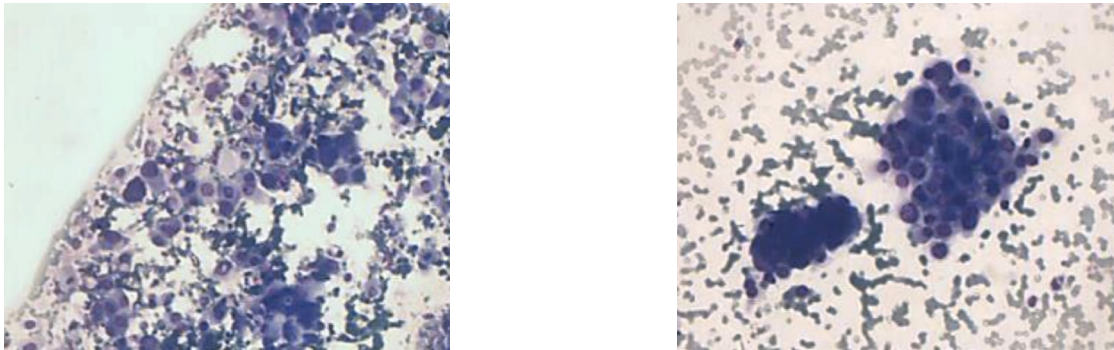
Figure 2a: *Photo micrograph of infiltrating ductal carcinoma. FNAC smear showing intense background haemorrahge with moderate retention of morphological details. B: FNCC smear showing better morphological detail and relatively less amount of background blood. (Giemas, X100)*

findings were observed in other study done by Maurya AK et al.[9]

Regarding amount of cellular material obtained by both the techniques for benign and malignant lesions of the breast, FNAC had higher scores compared to FNCC. In benign lesions of the breast FNAC scored 49 (81.6%) and FNCC scored 39 (65%) and in malignant lesions of the breast FNAC scored 29 (48.3%) and FNCC scored 22 (36.6%) respectively. This is in accordance to the study done in other study[10]

In a study conducted by Kumarasinghe et al, the non-aspiartion technique was found to be unsatisfactory for benign breast lesions while the adequacy of cellular yield was, however, comparable for malignant breast lesions with both techniques. They concluded that in benign breast lesions with fibrous stroma, the cutting effect of the sharp edge of the needle tip is probably not sufficient to scrape cells with the non-aspiration technique.[11]

In this study the number of inadequate samples obtained by both the techniques were two each (4.4%). This is in contrast to the study conducted by most of the other authors. Ghosh et al.[12] and Akhtar et al.[13] found that the number of unsuitable smears were more by FNCC technique. Ciatto. S et al. found that double sampling, independent of the specific techniques, reduced inadequacy rates to very low

level (1.2% for cancers;5.9% for benign masses) and may be useful as a routine policy.[14]

For all the 45 cases included in the study diagnosis was made by cytology and subsequently was confirmed by histology. Fibroadenoma was the most common benign lesions which accounted for 44.4% of all benign breast lesions. Infiltrating ductal carcinoma no special type was most common among malignant breast lesions which accounted for 28.8% of all malignant breast lesions. Similar findings were seen in other studies.[15-17]

This study showed a sensitivity and specificity of 100% respectively. This is similar to the findings of Ariga et al.[18] who reported 99% sensitivity, 99% positive predictive value, 99% specificity, and 99% negative predictive value for FNAC.

In this study, the positive and negative predictive value for FNAC was 100% which is comparable to the study of A.Khemka et al1 who found that positive predictive value was 100% and the negative predictive value was 95.12%.

CONCLUSION

Compared to fine needle aspiration cytology, fine needle capillary cytology is a simpler and less painful procedure

that yields less bloody smears with minimal degenerative changes and offers more diagnostically superior specimens. Fine needle aspiration cytology, on the other hand, gives a good yield of diagnostic material; hence both the techniques are complementary to each other.

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