Fine Needle Aspiration Cytology in A Palpable Breast Lump

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Abstract :

Background : Fine needle aspiration cytology has become widely accepted as a reliable tool for diagnosis of a palpable breast lump. **Aims :** To find out the advantages of breast FNAC in our hospital set up along with derivation of accuracy, sensitivity and specificity of the procedure by correlation with histopathological findings and to co-relate the same with other studies performed in different national and international institutes. **Methodology :** The present study is a two year retrospective study of FNAC and subsequent histopathology of breast lumps performed in the Pathology Department of our institute, during the period February 2011 to February 2013. **Results :** Benign breast lesions were common in the age group of 31-40 years and malignant breast lesions in 41-50 years. In our study fibrocystic change and simple cyst was most common benign lesion and ductal carcinoma was the most common malignant lesion. The sensitivity and specificity of FNAC for malignancy were found to be 87.1% and 87.5% respectively. **Conclusion :** FNA cytology is highly accurate for diagnosis of breast lumps. However, the clinician should correlate FNA cytological results with physical examination and imaging findings to prevent false negative and false positive events and to obtain optimal management for their patients.

Key Words: Breast lumps, fine needle aspiration, diagnostic accuracy, cytology, histopathology

Introduction :

India is facing a cancer epidemic. By 2020, 70% of the world's cancer cases will be in poor countries, with a fifth in India. Breast cancer is the most common malignant neoplasm affecting women worldwide. The Indian Council of Medical Research released an analysis of cancer cases among women in Delhi, Mumbai, Chennai, and Bangalore from 1982 to 2005, showing that until about 10 years ago, 10 per 100 000 women got breast cancer, compared with 23 per 100 000 now. In India, it is the second most common in women after cervical cancer .By 2020; breast cancer is set to overtake cervical cancer as the most common type of cancer among all women in India. [1]

Fine needle aspiration (FNA) cytology has become widely accepted as a reliable diagnostic tool for diagnosis breast masses. It is a simple and safe method which yields high diagnostic performances. [2-5] The procedure is considered very cost effective by being less invasive, less expensive, rapid, and as sensitive as biopsy. [3, 4] Thus, it plays a major role as an important preoperative assessment along with clinical and mammography examination, which together are frequently referred as "Triple test". [6] Combination of the triple test and open surgical biopsy has been firmly established as highly accurate in the diagnosis of breast masses.[6,7] In 2007, Chaiwun and Thorner reviewed

diagnostic performances of FNA in breast lesions; the sensitivity was in the range of 75.8-98.7%; specificity of 60-100%;positive predictive value of 93.5-100%; negative predictive value of 67-95.7%; accuracy of 72-94.8%; with false positive and false negative rates of 0-2.5% and 2.5-17.9% respectively.[8] Another recent meta-analytical review, including 25 studies of FNA, has shown that FNA cytological analysis of palpable breast masses is highly accurate to differentiate benign from malignant tumors.[9] Although core needle biopsy is preferred over FNA in some countries, such as the United Kingdom and the United States, [10, 11] it is still commonly used in Asia and other developing countries with low financial resources. [5, 8]

The aim of this study was to find out the advantages of breast FNAC in our hospital set up along with derivation of accuracy, sensitivity and specificity of the procedure by correlation with histopathological findings and to co-relate the same with other studies performed in different national and international institutes.

Methodology :

Material for this study was obtained retrospectively over a period of two years (Feb 2011-Feb 2013) from the Division of Cytology in the Department of Pathology. Majority of the aspirations were performed in the department itself by cytopathologists. Prior to aspiration, detailed history with physical examination of both the breasts and the lump were carried out to assess its size, mobility, and evidence of clinical signs of malignancy. Axillary nodes were also palpated for enlargement.

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Fine needle aspiration was done with a 21- or 22-gauge needle attached to a 5cc disposable syringe. The specimen was taken with minimum passes (to minimize hemorrhage) without needle withdrawal and under constant negative pressure. Samples were smeared onto glass slides and fixed as necessary. Wet-fixed smears were stained with hematoxylin and eosin (Hand E) stain.

All the cystic lesions were evacuated following which the wall of the cyst was needled. The cyst fluid was centrifuged and the deposit taken for smears.

The records of 132 patients who had undergone FNA of breast lump during the study period were retrieved and information about demographic data including age, sex, clinical findings, USG finding, mammography findings and FNA findings was extracted. Women who had FNA diagnoses for breast masses and underwent subsequent histopathologic evaluation were accessed from the archive of the Anatomical Pathology Department of our institution. Amongst a total of 132 patients with palpable breast lumps who underwent FNAC during the study period, 55 patients had a follow-up excision biopsy/lumpectomy/mastectomy done in our institution. Their FNAC findings were compared to the histopathologic diagnoses to give an assessment of the diagnostic performance of FNA.

During the period of study, breast lesions were interpreted according to the risk of developing cancer. Lesions were classified as benign lesion with no risk factor, benign lesions with mild to moderate risk for cancer, suspicious for malignancy and malignancy on FNAC. According to National cancer institute consensus conference on breast FNA, categorization of breast lesions are: Unsatisfactory, Benign, Atypical probably benign, suspicious probably malignant and Malignant. In histopathology they were classified as either benign or malignant.

After tabulation of the data, the sensitivity, specificity, positive and negative predictive values, false negative rate, false positive rate, and diagnostic accuracy of FNAC were determined.

Results :

A total of 132 FNAC cases were collected along with detail radiological and clinical findings. Histopathology examination of breast pathology was found in total of 55 cases. The FNAC report was correlated with the final histopathology report in 48 cases. Benign breast lesions were common in the age group of 31-40 years and malignant breast lesion common in the age of 41-50 years of age. Among them only 0.8% cases were male while 99.2% were female. Out of 132 cases benign lesion with no risk factor, including unsatisfactory samples were 49. Benign lesions with mild and moderate risk for cancer were 27 cases; suspicious for malignancies were 15 cases and malignancy were 41 cases. The details of these lesions are in Table 1 A, B and C respectively. Most common cases were fibrocystic change and simple cyst (12.7%) followed by fibroadenoma in benign breast lesion. Ductal carcinoma (32.5%) was the commonest malignant breast lesion.

Table 1: Diagnoses in 132 breast lumps on FNAC

A: Benign lesions with no risk of cancer.	
Diagnosis	**No. of cases**
I. Unsatisfactory sample	
II. Inflammatory breast lesion -	6
Breast abscess	7
Mastitis	11
Duct Ectasia	1
III. Nonproliferative breast disease	
Fibrocystic change and simple cyst	16
Epithelial hyperplasia, mild	2
IV. Miscellaneous breast lesion	
Lactational change/Galactocele	1
Gynaecomastia	1
Epidermal cyst	1
No evidence of malignancy	3
Total	49
B : Benign lesion with mild and moderate risk for cancer	
Diagnosis	**No. of cases**
I. Proliferative breast disease without atypia	
Epithelial hyperplasia, moderate	4
Adenosis	1
Papilloma	2
Fibroadenoma	13
Phylloedes tumor, benign	1
II. Proliferative breast disease with atypia but benign	6
Total	27
Table 1C : Suspicious and malignant lesions	
Diagnosis	**No. of cases**
I. Suspicious for malignancy	15
II. Malignant breast lesion	
Ductal carcinoma	41
Total	56

Out of 55 histological samples, 25 cases were benign breast disease and 30 cases were malignant lesions. Fibroadenoma was the commonest benign breast lesion and ductal carcinoma was the most common malignant lesions (Table 2A, B &C).FNAC correlation with histopathology is significant (Pvalue<0.05). The cytohistological correlation is shown in Table 3 ; 4/26 cases of benign cytology turned out to be malignant lesions (false negatives); 6/8 cases of suspicious cytology were truly malignant while the other 2 were benign; and only 1/21 with malignant cytology was benign (false positive), the lesion being a intraductal proliferation. The overall accuracy, sensitivity, specificity, positive predictive value, and negative predictive value were 87.3%, 87.1%, 87.5%, 90% and 84%, respectively, which was quite comparable to the findings of the other studies [8, 9, 14-17].

Discussion :

FNAC of breast lump is an accepted and established method to determine the nature of breast lump with high degree of accuracy [6, 12]. The application of FNA for the diagnosis of palpable breast masses was first introduced by Martin and Ellis[13] in 1930, and since then, it has been established as an important tool in the evaluation of breast lesions. FNAC is simple, cost effective and less traumatic

Table 2 : Diagnoses in 55 breast lumps on Histopathology

A : Lesions with no risk of cancer	
Diagnosis	**No. of cases**
I. Inflammatory breast lesions	
Breast Abscess	1
Mastitis	1
Duct ectasia	1
II. Nonproliferative breast disease -	
Fibrocystic change	7
Total	**10**
B: Lesions with mild and moderate risk of cancer	
I. Proliferative breast disease without atypia	
Epithelial hyperplasia	1
Fibroadenoma	13
II. Proliferative breast disease with atypia	1
Total	**15**
C: Histology of Malignant breast lesion	
Malignant lesions	
Ductal carcinoma, NOS	28
Lobular carcinoma	1
Medullary carcinoma	1
Total	**30**

Table-3 Cytohistological correlation

FNAC	Histopathology										No. Of Cases
	Benign							Malignant			
	FA	FCD	Mastitis	Breast Abscess	PBD Without atypia	PBD With atypia	Duct Ectasia	IDC	LC	MC	
Negative for malignancy	1	1									2
Inflammatory lesion			1				1	1			3
Breast abscess		1		1							2
Fibrocystic disease		3									3
Fibroadenoma	6	1									7
Intraductal proliferation	6							2			8
Phylloid									1		1
Suspicious of malignancy		1				1		6			8
Invasive ductal carcinoma					1			19		1	21

FA-Fibroadenoma, FCD-fibrocystic disease, PBD-Proliferative breast disease,
IDC-Invasive ductal carcinoma, LC-Lobular carcinoma, MC-Medullary carcinoma.

as well as highly sensitive and specific method for assessment of breast lumps. Most of the patients with breast lump are in a state of anxiety, so to reduce anxiety and unnecessary surgical procedures as well as to minimize delay in diagnosis, FNAC plays important role.

This study documented the fact that the benign lesions of breast are the most common lesions. This increased case of benign lesions indicates increase in awareness of patients. In such lesions the reassurance is the main line of treatment though close follow up is mandatory. Such lesions are more common in young females.

We found 4.5% of cases in our study had inadequate mammary epithelial cells that the cytologic diagnosis could not be made. Other studies showed frequency of inadequate specimens varied tremendously from 0.7%-47% [5, 8].Some authors provided the reasons for unsatisfactory Specimens [18-19] . One was the insufficient experience of the physician who performed the aspirations while another possibility was the nature of the lesions themselves. For example, hypocellular lesions (which contained few cellular components) and some malignant lesions frequently had unsatisfactory cytology. Others suggested some measures to reduce the rate: the Proper training of the physicians who perform the aspirates [20], the use of ultrasound guided FNA [21] and an immediate evaluation by a pathologist using rapid staining either Romanosky or Diff-Quick stain [5]. Our study found fewer unsatisfactory specimens compared to the other studies. This may lie with many reasons. First, we had a practice guideline of the institution that the operator performing the aspiration had to be an experienced Pathologist of the Department of Pathology. Second, all women with mass lesions usually had undergone mammography with ultrasonography before the surgical procedure. Ultrasonographic findings were available to help the pathologist locate the actual site of a lesion. Third, the aspirations were submitted to the Anatomical Pathology Department right after the procedure.

Our study had suspicious FNA diagnoses (atypical/suspicious aspirates) at 15.9%, in line with previous reports in the range of 4%-17.7% [5]. Our high prevalence rate of suspicious FNA might be due to the level of precaution or the preference of the pathologist in each institution. Our cytopathologist tended to give the primary cytologic diagnosis of suspicious lesion when there were some atypical cellular features but without definite evidences of malignancy. Then direct contact with the surgeon was carried out to gain more clinical information. The majority of our suspicious cases turned out to be malignant lesions from the subsequent histopathology (75%).

When the suspicious and malignant cases were grouped together, the false positive in our study were encountered in 3 cases (5.0%). Other studies reported that false positive results of FNA of breast masses are uncommon, occurring in 0-2.5%. [5, 8] The differences might lie on the grouping of the suspicious cases together with or separated from malignant cases. As mentioned earlier, our study included the suspicious cases together with the malignant cases; the former group of the suspicious cytology contribute to the majority of the false positive cases (2/3 cases). When we reviewed these slides, we found that most of them were due to error in interpretation.

Thus, we agree with previous studies that suspicious cases should have confirmed by histopathological examination. [5] In this study, the histopathologic diagnoses of these false positive (from the suspicious cases) were fibrocystic disease (one case) and benign proliferative disease with atypia (second case). These findings were similar to prior reports that the epithelial proliferative of ductal or lobular hyperplasia often accounted for the false positive result. [18] This certainly emphasizes the role of experience to minimize the false positive rate. The only benign case which was interpreted as malignant was benign proliferative disease without atypia, in line with the earlier report that cytomorphological features of fibroadenoma, benign, proliferative and non-proliferative lesions, and malignant tumors may overlap. [22]

One case of malignancy was diagnosed as inflammatory lesion by FNAC. This was because of presence of severe inflammation and necrosis without viable malignant cells in FNAC. So if there is extensive inflammation in FNAC, it is better to correlate the findings with clinical diagnosis and to take core biopsy to avoid misdiagnosis. Two cases of intraductal carcinoma were diagnosed as intraductal proliferation on FNAC; however excision was advised in one of them. One case of lobular carcinoma was misdiagnosed as phylloid in FNAC.

FNAC of breast lesions is sensitive, specific, and highly accurate as the initial investigation of palpable breast lesions in tertiary hospital. [23] Thus the FNAC smears have very high accuracy in diagnosis of breast lump. [6, 24]

Conclusion :

The FNAC of breast is cheap, safe and highly accurate preoperative method for diagnosis of breast lesions. Preoperative categorization of breast lesions is utmost important for management of the patient.

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