Correlation of Fine Needle Aspiration Cytology (FNAC) with Histopathology in Breast Lump

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Abstract

Introduction: Breast lump is one of the most common surgical problems in female. Fine needle aspiration cytology (FNAC) and histopathology are two investigational tools often used to differentiate malignant breast lump from benign one. The aim of present study was to find out the sensitivity, specificity and predictive values of fine needle aspiration cytology (FNAC) and compare it to histopathology in breast lump. *Material and Method*: Fifty patients who presented with clinically palpable breast lump at the department of surgery, Bombay Hospital India during the year 2005-2007 were included. All patients underwent FNAC by disposable fine needle, 21-25 gauges, outside diameter 1.2 to 1.6mm and 30-50mm in length , the detailed clinical examination and mammography were done before FNAC and 49 patients underwent different operative procedures like excision biopsy, frozen section and MRM. Histopathological examination was done on the specimen. The diagnosis was made by the pathology department of Bombay Hospital. *Results:* Out of fifty cases in which FNAC were done, 20 were diagnosed with benign lesions, 27 as malignant lesions and 3 as suspicious. Out of 49 patients in which histopathology were done 28 patients had infiltrating ductal carcinoma, and 12 patients had fibroadenoma. Sensitivity, specificity, positive and negative predictive values of FNAC were 81%, 100%, 100%, 72% respectively. *Conclusion*: FNAC and histopathology are 100% specific in diagnosing malignant breast lesion. Although histopathology appears more sensitive than FNAC the later procedure is safe, quick and economical.

Keywords: Breast Lump; FNAC; Histopathology; Breast Lump.

Introduction

Breast cancer (BC) has been identified to be as one of the most occurring cancer in women globally. About 1.7 million new cases were identified in the year 2012 around the globe, among them about half of the cases were reported to have deaths developing nations [1]. Reports presenting breast cancer studies, suggest prevalence of breast lumps as one of major feature as observed with patients in regular OPD throughout the world [2]. The reports suggest about 90% lumps of benign origin having no grave consequences; contrary to this the malignant lumps contribute to percentage of all breast lumps that are responsible for consequential deaths due to BC [2]. With growing awareness in general public about signs and symptoms of BC and associated chances of deaths make the patients necessary to take medical advice from physicians [3,4]. The clinicians are however not able to identify whether the observed lumps are of benign or malignant origin by only physical evaluation [5], however a confirm diagnosis can be done by involving physical examination with imaging and histological examination [6].

Fine needle aspiration cytology (FNAC) is established to be one of the simple, economical, reliable having better patient acceptability technique for the evaluation of mass lesions in BC. FNAC can be repeated if adequate aspirate is not obtained [4]. FNAC is a well established procedure for identifying suspected cases of BC in women's [7]. Though FNAC

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has became a important diagnostic tool for identifying suspected breast lumps, cytopathologists have encountered false-negative results, which have become a major point of concern [8]. FNAC has lowered the chances of open biopsies due to being a simple and specific technique. However, Open biopsy still remains a preferable technique due to lack of expert cytologists [9]. The open biopsy technique uses analysis of lesions by involving histological study of the tissue samples obtained from patients and can provide all the necessary and reliable data to the oncologist and surgeon for planning the required therapeutic strategies for treating the patient. The open biopsy allows the use of neo-adjuvant therapy [10]. On the other hand number of literatures point FNAC has specificity ranging from 99 to 100 % and sensitivity ranging from 80 to 98% [11]. This makes the necessity of correlating FNAC with histology involved with open biopsy. Given the common occurrence of breast cancer and the importance of accurately diagnosing clinically palpable lump, with the non invasive techniques without routinely resorting to formal biopsy which is much invasive, the study is proposed to evaluate the accuracy of FNAC in the diagnosis of newly detected clinically palpable breast lumps in comparison to the final Histopathological (HPE) report of the biopsied specimens.

Material and Methods

Patients and Inclusion Criteria

Present study was a comparative cross-sectional study conducted at Bombay hospital, Mumbai, India, from January 2007 to January 2008. The Ethical Review Board of Bombay hospital, Mumbai, India approved the study. All the subjects were informed of their right to refuse participation and of the respect of the confidentiality of their answers. Informed consent was filled by all the subjects included in the study. All the female patients having unknown primary diagnosis of breast lumps and had undergone FNAC followed by excision biopsy, were included in the study. The study included 50 cases.

FNAC and Excision Biopsy

All the 50 patients underwent FNAC by disposable fine needle 21-25 gauges, outside diameter 1.2 to 1.6mm and 30 to 50mm in length, disposable syringes of 10 ml used for aspiration under local infiltration by 2% lignocaine, glass slides with frosted ends (75mm long & 25mm wide & 1.3mm thick) were used, two fixative methods were employed, air drying and wet fixation with 95% ethanol. Reports were collected and grouped in to three categories for easy analysis as benign, malignant and suspicious.

Among the 50 subjects 49 patients underwent different operative procedure like excision biopsy,

frozen section and MRM. The biopsy specimens were stored in 10% formalin for 24h. The overall histopathological examination was done on the specimen in the pathology department of Bombay Hospital. Several small tissue bits were collected from the target sites for processing and paraffin embedding. From each block, sections were cut at 4-5 microns thickness and stained with H & E. Reports were collected and grouped in to three categories for easy analysis as benign, malignant and suspicious.

Statistical Analysis

Statistical analysis was done using GraphPad Prism software. The data was represented as the mean ± standard deviation (SD), while the categorical and nominal data was presented as frequencies and percentages. Pearson's correlation was applied and a p-value of <0.05 was taken as statistically significant with a confidence level of 95%. Data were analyzed so as to determine the specificity, sensitivity and predictive values of FNAC.

Results and Observation

Outcomes of FNAC

In our study all the 50 patients identified susceptible for breast lumps by physical examination were subjected to FNAC. The outcomes of FNAC suggested, 20 (40%) patients were categorized with benign disease of breast cancer, among which 10 patients (50%) showed Fibrodenoma, 05 patients (25 %) showed Benign proliferative breast disease, 02 patients (10%) with Inflammatory cells seen and 1 patient (5%) each showing cellular atypia, Galctocele and aspiration of pus respectively (Table 1). 27 (54%) patients were found to have malignant form of breast cancer Out of which 23 patients (85.2%) were diagnosed to have cytologically as ductal carcinoma, 02 patients (7.4%) showed Invasive *ductal* carcinoma , 01 patient (3.7%) each showed adenocarcinoma and Necrotic carcinoma of the breast respectively (Table 2). About 3 (5%) patients were identified as suspicious of malignancy, Out of which 2 were diagnosed to have infiltrating ductal carcinoma by frozen section and excision biopsy and 1 as fibrocystic disease of breast by excision biopsy.

Outcomes of Histopathology Study

The outcomes of histopathology suggested about 28 patients (57.1%) with Invasive *ductal* carcinoma, 12 (24.5%) with Fibrodenoma, 02 (4.1%) with Invasive lobular carcinoma and Necrotic tissue each, 1 patient (2%) with Medullary carcinoma, Tubular carcinoma, Phylloid tumour, Mastitis and Papillary adenocarcinoma each (Table 3).

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In the present study, the results of FNAC suggested 20 patients to have diagnosed for benign disease, but after performing histopathology of the FNAC diagnosed benign patients we established a correlation. We found that about 15 patients (75%) were confirmed for benign disease and 5 (25%) turned out to be malignant. The outcomes of all the FNAC diagnosed malignant patients showed the same pattern with histopathology studies, whereas the 3 patients suspicious under FNAC results upon histopathology showed 02 patients for malignancy and 01 patient for Benign pattern. The observations of histopathology were more precise in diagnosing FNAC results and were helpful in differentiating the malignant and benign cases (Table 4).

The sensitivity of FNAC was 81%, the specificity was 100%, the positive predictive value was 100% and negative predictive value was 72% . The results are depicted in Table 5.

Table 1: Spectrum of benign aspirate by FNAC

Cytological diagnosis	No. of Patients	Percent
Fibroadenoma	10	50%
Benign proliferative breast disease	05	25%
Inflammatory cells seen	02	10%
Cellular atypia	01	05%
Galactocele	01	05%
Aspiration of pus	01	05%
Total	20	100%

Table 2: Spectrum of malignant aspirate FNAC

Cytological Diagnosis	No. of Patients	Percent
Carcinoma ductal type	23	85.2%
Invasive ductal carcinoma	02	7.4%
Adenocarcinoma	01	3.7%
Necrotic carcinoma	01	3.7%
Total	27	100%

Table 3: Results of Histopathological analysis

Histopathological diagnosis	No. of patients	Percent
Invasive **ductal** carcinoma	28	57.1%
Fibroadenoma	12	24.5%
Invasive lobular carcinoma	02	4.1%
Necrotic tissue	02	4.1%
Medullary carcinoma	01	2%
Tubular carcinoma	01	2%
Phylloid tumour	01	2%
Mastitis	01	2%
Papillary adenocarcinoma	01	2%
Total	49	100%

Table 4: Correlation of FNAC with histopathology

	Investigation method	
	FNAC	Histopathology
Benign	20	15 +(1 suspicious for Benign)
Malignant	27 +(3 suspicious for malignant)	32 +(2 suspicious for malignant)
Total	50	33

Table 5: Sensitivity and specificity of FNAC

	Percent
Sensitivity	81%
Specificity	100%
Positive predictive value	100%
Negative predictive value	72%

Discussion

Present study deals with establishing a correlation between FNAC and histology with open biopsy. The study was carried at Bombay hospital, Mumbai, India, from January 2007 to January 2008. The Ethical Review Board of Bombay hospital, Mumbai, India approved the study, a total of 50 patients were included in the study and underwent FNAC at Bombay Hospital. The FNAC study suggested 20 (40%) benign disease of breast and 27 (54%) as malignant and 3 as suspicious of malignancy (6%). The outcomes of our study were comparable to study reported by Sneige N in 1995 [12], done among 1082 patients FNAC study suggested 690 were malignant (60.2%), 343 were benign (29.9%) and 49 as suspicious (4.3%).

In our study, we found that sensitivity of FNAC was 81%, specificity was 100%, positive predictive value being 100% and negative predictive value 72%, the results were in close association with study reported by S. Nicholson et al. [13], done on 884 aspiration of breast cancer; they found FNAC had sensitivity of 88% and specificity 92.5%. In a another study reported by Homesh NA et al. [14], the sensitivity of FNAC was 66.66%, specificity was 81.7%, positive predictive value was 100% and negative predictive value was 90%, in a study done on 296 patients. In another study, Sneign N et al. [12], reported the sensitivity 96%, specificity was 99%, the positive predictive value was 96% and negative predictive value was 94%. However, in study by O Neils et al. [15] the sensitivity was found to be 97%, specificity 78%, positive predictive value 92% and negative predictive value 92%. In another study by He Q et al. [16] in 1238 patients, the sensitivity was 97.72% and specificity was 99.4%.

Conclusion

The study concludes that when used expertly, FNAC is safe, quick and economical. It is a less traumatic procedure which produces high percentage of diagnostic result. It does not require hospitalization. Patient's inconvenience and discomfort are minimal. It provides quick and prompt diagnosis. Accurate localization of lesions, use of fine needles and passes made are major factors in patient's safety. It may be performed as out-patients procedure or bedside; it requires no sedation, anesthesia or any other preparation except careful explanation of the proper procedure, to the patient.

The equipment required is cheap and readily available. The procedure causes minimal pain because of the size of needle used, as a result patients readily accept to a second aspiration as and when necessary. However, the optimum success of FNAC requires an interdisciplinary approach, a partnership between surgeon, pathologist and radiologist. FNAC assisted by up to date imaging procedure has emerged as a valuable tool in patients care. FNAC does not replace histology but augments it. They could be considered as opposite faces of same coin. Rapid staining of some of slides allows at least a preliminary diagnosis within few minutes. Pneumothorax, hematoma and acute mastitis are rare complication of this procedure.

The main limitation of FNAC, as concluded from this study is that if sampling is scanty, it may not represent the specimen accurately, which makes the process of diagnosis difficult and necessities the need of a expert cytologist.

Hence, we conclude that FNAC is valuable diagnostic asset when used with proper clinical data of the patient, it's an acceptable technique when supported by a qualified and expert pathologist.

Acknowledgment

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