RESEARCH ARTICLE

Spectrum of Cytological Findings in Fine Needle Aspiration Cytology of Breast Lumps with Histopathology Correlation: Experience in a Tertiary Care Rural Hospital in India

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Abstract

To determine the pattern of disease in patients presenting with breast lumps and to determine the sensitivity and specificity of fine needle aspiration cytology of benign and malignant diseases as a diagnostic tool by correlating with histopathology findings. This retrospective study was carried out in the Department of Pathology, Maharaja Agrasen Medical College, Agroha, from Jan 2008 to April 2012. Fine needle aspiration cytology was performed on 370 cases and out of these 52 cases were received in the Department for histopathological examination. Fibroadenoma was the most common disease encountered, in 88 (24%), with a peak incidence in second and third decade of life. Fibrocystic disease was second, being common in the third and fourth decades of life. Peak incidences of duct ectasia, granulomatous and tubercular mastitis were seen in the third decade. Gynaecomastia showed two peak incidences in second and sixth decades of life . Out of total 370 cases undergoing fine needle aspiration, benign cases were 316 (85.4%), malignant and suspicious were 54 (14.6%) and 10 (2.70%) respectively. Out of total 22 histological confirmed malignant lesions 19 were interpreted as malignant cytologically while two as suspicious and one as benign. All thirty histologically confirmed benign cases were diagnosed as benign cytologically. The sensitivity, specificity, positive and negative predictive values were 98%, 100%, 100% and 96.4% respectively. FNA cytology is highly accurate for diagnosis of breast masses. 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 of their patients.

Keywords: Breast lumps - fibroadenoma - ductal carcinoma - diagnostic accuracy - India

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Introduction

Breast cancer is the leading cause of morbidity and mortality. Diseases of the breast constitute a significant proportion of surgical cases seen in both developed and developing countries, and frequently, the need arises to distinguish benign from malignant lesion prior to definitive treatment. There is increasing awareness and the associated anxiety and stress, particularly, among woman who perceive every symptom in the breast as a cancer, which compels the patient to seek medical advice. However, it is sometimes difficult to determine whether a suspicious lump is benign or malignant simply from clinical assessment. Therefore a method of definitive diagnosis of patients who presents with breast lump at the outpatient department is needed, in order to reassure the patient to offer the best possible treatment. A confident diagnosis can be made through a combination of clinical examination; imaging (mammography, and or ultrasound) and fine needle aspiration cytology i.e. triple assessment. (Ahmed et al., 2007). Fine needle aspiration cytology is sensitive, simple, cost effective less traumatic and rapid method. (Nastui et al., 2002). It can be easily repeated if an adequate sample is not obtained. This study was conducted to determine the pattern of disease presents with breast lump and to determine the sensitivity and specificity of fine needle aspiration cytology of benign and malignant diseases as a diagnostic tool by correlating it with histopathology findings.

Materials and Methods

This was a Retrospective study done in the department of pathology, Maharaja Agrasen Medical College Agroha from Jan 2008 to April 2012. A detailed clinical history of symptoms related to the breast such as mastalgia, nipple discharge, retraction and their relation with menstruation was noted. Detail of family history, menstrual history and history of malignancy of the organ were inquired. Breast was examined with respect to nipple, areola, and detail of lump including size, site surface, margins, mobility, and consistency, fixity to underlying structure, skin and chest wall. Axilla of same side was examined for lymph nodes. Local examination was completed only after examination of opposite breast and axilla. Fine needle aspiration was done with the 21 or 23 gauge needle attached to a

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10cc airtight disposable syringe with plunger. Aspirated material was smeared onto the glass slide in each case. Slides were immediately fixed in fixative solution and air dried. The air dried smears were stained with May Grunwald Giemsa (MGG). Wet fixed smear were stained with Papanicolaou stain and Haematoxylin and Eosin (H&E). Special stains like Ziehl- Neelson (ZN) stain for acid fast bacilli and Periodic Acid Schiff (PAS) stain was used whenever required.

Results

Fine needle Aspiration cytology was performed on 370 cases and out of these 52 cases were received in the department for histopathological examination. Out of total 370 cases on fine needle aspiration, benign cases were 316 (85.40%) , malignant and suspicious were 54(14.6%) and 10 (2.70%) respectively. The Maximum number of cases was in the age group of 21-30 years in benign breast lesion and in the age group of 41-50 years in malignant breast lesion. Among them only 4.5% cases were male and 95.5% were female. Fibroadenoma was the most common disease encountered, 88 (24%). On aspiration smears are cellular with a bimodal pattern containing epithelial and stromal fragments. There are large branching sheets of bland epithelial cells with numerous single bare bipolar nuclei in the background. Fragments of fibromyxoid stroma are also noted. In our study Peek incidence of fibroadenoma was noted in second and third decade of life (Table 1). Next common disease was fibrocystic disease (n-45, 12.16%). It was more common in 4th decade. Fibrocystic disease clinically cause an indistinct thickening or lump, or an asymmetrical density on mammogram. On aspiration smear shows epithelial fragments of usual epithelial cells with scattered single bare bipolar oval nuclei. Background shows apocrine metaplastic cells macrophages and variable amount of cyst fluid. In our study fibrocystic disease is more common in fourth decade. There were certain cases which shows only benign ductal epithelial cells admixed with myoepithelial cells in the absence of fibromyxoid stromal fragments, apocrine cells and macrophages in the background of naked bipolar myoepithelial cells. Such all cases were grouped together under the umbrella of benign breast disease. There were total six cases of simple breast cyst. Out of six four cases are seen during fourth decade. On aspirate varying amount of fluid is obtained which is often of varying colour. After aspiration mass usually disappear. Clinically well defined palpable lesion is found in same age range as of breast carcinoma (Table 1.) but rare under the age of thirty and almost never noted as palpable lesion over the age of 55. On microscopic examination smears are often partially cellular shows foamy macrophages, cyst debris and occasional siderophages. Also noted are apocrine metaplastic cell and occasional clusters of small ductal epithelial cells. Fat necrosis is a benign lesion usually arising following trauma .Clinically patients usually presents as firm to hard breast lump that may appear tethered to the skin. On aspirate sample is oily with particulate yellowish material. On microscopy smears are hypocellular show fragments of degenerating adipocytes that can be three dimensional along with foamy macrophages and foreign body type of giant cells .Background is dirty shows few epithelial cells. In our study there are two cases of fat necrosis both of them giving the history of trauma. Gynecomastia is a benign proliferation of ducts and stroma in the male breast. On Aspirate smears are usually cellular shows uniform cells in tight clusters and group. Some nuclear overlapping can be seen. Background shows adundant myoepithelial cells. Gynecomastia develop as a response to increased estrogen level. In our study increased incidence of gynaecomastia was seen in teen age man and in older age groups (Table 1). In teenage man gynecomastia due to hormonal imbalance where as in older age hormone producing tumor are responsible for increased estrogen or its precursor. These includes Leydig cell tumor , hepatoma, feminizing adrenal tumor and small cell carcinoma. Exogenous estrogens such as used in the treatment of carcinoma prostrate and application of estradiol to the scalp can result in gynecomastia. Drugs like spironolactone also implicated in production of gynecomastia. In granulomatous mastitis patients usually presents with an ill defined sometimes rapidly enlarging mass. On aspirate smears are moderately cellular show abundant epitheloid cells with mixture of inflammatory cells including neutrophils. There is presence of multinucleated giant cells, karyorrhectic nuclei and debris in the background. Indeed, on cytological ground granulomatous mastitis is indistinguishable from Tuberculous mastitis. The identification of Acid fast bacilli on direct smear and culture should be attempted, but histopathological examination will usually be necessary to provide a firm diagnosis. In our study we label the patients as Tuberculous mastitis in cytology only when both caseous necrosis and acid fast bacilli were positive. In our study there were total nineteen cases of granulomatous mastitis and they were more common in second and third decade of life. Out of these three cases were showing caseous necrosis and acid fast bacilli included under Tuberculous mastitis. Aspirate from phyllod tumor differ from fibroadenoma with greater stromal to epithelial ratio. Fibromyxoid stromal fragments are large in size

Table 1. Spectrum of Cytology Findings of Breast Lump in Different Age Groups

Categories	Age in years						Total
	10-20	21-30	31-40	41-50	51-60	>60	
Fibroadenoma	25	48	15	-			88
Phyllodes tumour			1	2			3
Fibrocystic disease		13	24	6	2		45
Benign breast disease	2	26	13	0			41
Proliferative breast disease with or without atypia		4	9	5	2	2	22
Duct Ectasia		14	5	1			20
Gyneacomastia	5	3	2		5	1	16
Fat necrosis			2				2
Simple breast cyst		0	4		2		6
Granulomatous		11	2		2	1	16
Lipoma			2	1			3
Accessory breast		2					2
Tuberculosis		3					3
Breast abscess	4	23	6	6			39
Suspicious for malignancy		1	4	3	1	1	10
Malignancy		1	12	21	10	10	54

and are more cellular. Proportion of spindle cells in the background are important features in such differentiation. The stromal nuclei are wavy and thin in fibroadenoma and plump and spindle shaped in phylloid tumor. In our study three cases of phylloides tumor was seen at or above the age of forty. This shows that phylloid tumors are more common above the age of forty and fibroadenoma is rare at this age group. Clinical features are helpful as fibroadenoma occurs in younger age groups than do the phylloides tumor and there is usually history of rapidly growing breast mass . Aspirate from proliferative breast disease are cellular shows large sheets of cohesive epithelial cells with few single cells. In usual ductal epithelial hyperplasia, ductal epithelial cells are often seen in streaming pattern with focal crowding and overlapping of nuclei in the absence of nuclear atypia or sometimes with mild atypia but appearance of holes suggestive of cribriform pattern with mild to moderate nuclear atypia points towards atypical ductal hyperplasia. In our study there are twenty two cases of proliferative breast disease out of which two cases were showing features of atypical hyperplasia. Lipoma from breast clinically appears as well defined rounded soft mass. This will give empty sensation on needling. Aspirate are comprised of cluster of mature adipocytes often with capillaries traversing them.

Out of the total twenty two confirmed malignant cases, nineteen cases were given malignant on cytology, two cases as suspicious for malignancy and one case as benign. There was no benign confirmed case on histology which was given malignant on cytology report (Table 2). So there were fifty one true positive, one false negative and no false positive and no true negative cases in our study. So in our study sensitivity and positive predictive value of fine needle aspiration cytology were 98.1% and 100% respectively, while specificity and negative predictive value for malignancy were 100% and 96.8% respectively (Table 3).

Table 2. Comparison of Fine Needle Aspiration Cytology and Histopathological Findings

S.No. Categories	Cytological diagnosis	Tissue available for HPE	Histopathological diagnosis
1. Acute& chronic inflammatory	43	3	3
2. Benign	194	28	27
3. Atypical	2	nil	Nil
4. Suspicious	10	2	Nil
5. Malignant	41	19	22
6. Total		52	52

Table 3. Statistical Analysis for Detection of Malignant Lesions

S.No. Parameter	Percentage (%)
1. Senstivity	98.1
2. Specificity	100
3. Positive predictive value	100
4. Negative predictive value	96.8

Table 4. Statistical Comparision of Our Results with Various Studies

Name of Study	Sensitivity	Specificity	Positive Predictive value	Negative Predictive value
Hussain MT(2005)	90.90%	100%	-	-
Jayaram et al (1996)	97.40%	92.40%	-	-
Muhamed et al (2005)	90.60%	100%	100%	99%
Rubin et al	87%	100%	100%	89%
Ishikawa et al	86.30%	98.20%	97.90%	-
Ariga et al	99%	99%	99%	99%
present study	98%	100%	100%	97%

Discussion

Lumps in the breast may be benign or malignant. Preoperative diagnosis helps in planning the correct surgical and therapeutic treatment. It has been recommended that all patients with discrete breast lump should undergo triple assessment to make an early diagnosis. Fine needle aspiration cytology has been determined to be highly accurate tool in preoperative diagnosis of breast lesions. The FNAC used to be the quickest and reliable method for getting the diagnosis. In the present study, fibroadenoma was more commonly seen in age group of 21-30 years. Similar results were shown by many studies (Khanna, 1988; Khanzada et al., 2009; Iyer, 2000; Ochicha, 2002; Siddiqui, 2003; Akhator, 2007; Irabor, 2008). In most of the above mentioned series, fibroadenoma had the most common age of presentation 21-30 years. Thus, the present study is in concordance with the studies available in the literature. The fibrocystic disease was next common condition in our study and majority of the patients belonged to fourth and fifth decade. The incidence varies geographically. This is 2nd most common condition in many studies from Pakistan and India (Abdullah et al., 1999; Khanzada et al., 2009; Khemkha et al., 2009). Phylloides tumour represented 3 (0.8%) of all lesions which is similar to that reported by an Akhator (0.65%) (Akhator, 2007). Breast abscess accounted for 10.5% of lesions as compared to the 8.0% reported by Ochicha O (2002) and 6.8% found by Siddiqui (2003). Singh et al. (2011) reported that invasive ductal carcinoma is the commonest breast malignancy and found in the age group of 41-60 years of age. The present study shows similar findings, the ductal carcinoma being the most common breast malignancy in the age group of 41-60 year of age. Fine needle Aspiration Cytology has been proved to be a highly efficacious method in diagnosis of palpable breast lesion in our study. The sensitivity of 98.07% and specificity of 100% obtained in our study were in accordance to sensitivity of 86-99% and specificity of 92-100% reported in various studies (Jayaram et al., 1996; Rubin et al., 1997; Argia et al., 2002; Hussain, 2005; Muhamed et al., 2005; Ishikawa et al., 2007).

In conclusion, this study indicate that FNAC is a highly reliable tool in the assessment of breast masses for the differential diagnosis of benign from malignant nature and can be utilised as first line diagnostic procedure in patients presenting with breast lump especially in the developing countries with limited resources. However we support the standard recommendation that the patient with breast masses should be diagnosed based on the combination of physical examination, radiological modalities and FNAC (the triple test).

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