Correlation of Fine Needle Aspiration Cytology with Histopathology of Malignant Breast Lesions in a Tertiary Care Hospital- Mandya

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ABSTRACT

BACKGROUND
Breast cancer is a common malignant lesion in women. Fine needle aspiration cytology has high sensitivity and specificity and is a simple, rapid and safe method to diagnose breast lesions. The aim of the study was to evaluate malignant breast lesions and correlate the fine needle aspiration cytology diagnosis with histopathological findings.

METHODS
This is a prospective study done in the Department of Pathology of Mandya Institute of Medical Sciences, Mandya. The study was conducted for a period of 1.5 years from January 2016 to June 2017. There was a total 200 FNAC cases. Out of 200 cases of breast FNACs evaluated, histopathological correlations were available for 88 cases. Among 200 cases, two cases were inadequate for evaluation, 160 cases were benign, three cases were diagnosed as atypia probably benign, one case was diagnosed as suspicious of malignancy and 34 cases were diagnosed as malignant.

RESULTS
Out of 34 malignant cases, majority of the cases were in the age group of 41 to 50 years followed by 31 to 40 years. Of the 34 malignant cases, 28 were reported as Infiltrating Ductal Carcinoma, Not Otherwise Specified (NOS) type, three cases were reported as mucinous carcinoma breast on cytology, one case was reported as medullary carcinoma breast, one case was reported as papillary carcinoma breast and one case was reported as metaplastic carcinoma breast on cytology. Among these 34 cases, 27 cases were available for histopathological correlation which proved to be malignant on histopathology also. FNAC proved to be 100% sensitive and specific in the diagnosis of malignant lesions.

CONCLUSIONS
Fine needle aspiration cytology is a highly sensitive and specific technique for diagnosis of malignant breast lesions.

KEYWORDS
Fine Needle Aspiration Cytology, Breast Cancer, Infiltrating Duct Carcinoma

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BACKGROUND

Lesions of the breast are among the most common health problems in females. They primarily present with pain, palpable mass, nipple discharge or structural abnormalities in the form of calcifications, opacities etc., on imaging studies.[1] The incidence of breast cancer in recent decades has increased worldwide, mainly due to improvements in screening and diagnosis, as well as to changes in the lifestyle and habits of women. [2] Breast cancer is the most common non skin malignancy in women and it is second only to the lung cancer as a cause of cancer death.[3] Incidence of breast cancer increases with age like that of other epithelial tumours. Patients with breast cancer will have very good prognosis if detected at an early stage.[4]

According to GLOBOCAN 2012 project, breast cancer is the second most common cancer in the world with an incidence of 1.67 million cases. Breast cancer is the most common cancer in women in India, way ahead of cervical cancer. In India 1,44,937 women were newly detected with breast cancer and 70,218 died of breast cancer. Male breast carcinoma accounts for less than 1% of all cases (male and female) of diagnosed breast cancer & less than 1% of all cancers in men.[5] Breast cancer incidence peaks between the ages of 40 and 50 year, with a mean age of occurrence at 47 years. Breast cancer patients in India mostly presents with palpable lump and with the lymph node metastasis at the time of diagnosis.[6] A method of definitive diagnosis of the breast lesions is therefore needed in order to reassure the patient and to offer best possible treatment.[7] Fine needle aspiration cytology (FNAC) is a technique which is routinely done on palpable lesions such as superficial growth of the skin, subcutis, soft tissues and various organs of body like thyroid, breast, salivary glands and lymph nodes. It is relatively simple, reliable, economical and complication free procedure. With radiological techniques like ultrasound and computed tomography, material can be obtained through transthoracic and transperitoneal approaches from deep seated lesions.[8] The main purpose of FNAC of breast lesions is in investigation of any palpable breast lump and to avoid unnecessary surgery. The advantages are-it is safe, accurate, and rapid technique. It does not require elaborate tissue processing and is therefore less expensive method of diagnosis. It does not require anaesthesia or hospitalization. FNA can be done on palpable lesions either solid or cystic, or deep seated non palpable lesions with the help of ultrasound and mammography.[9] It allows a number of ancillary studies such as hormone receptor analysis, flow cytometry and molecular diagnostic studies.[10] FNAC has superseded the use of frozen section examination in the diagnosis and management of patients with breast cancer, and plays a major role as an important preoperative assessment along with clinical correlation and mammography which are referred to as the 'Triple Test'.[11]

We wanted to conduct a cytomorphological study of malignant breast lesions using fine needle aspiration cytology and Correlate the cytological diagnosis with histopathology wherever surgical intervention is done.

METHODS

In the present prospective study, fine needle aspiration was done on the clinically palpable breast lumps, referred from MIMS hospital to the Department of Cytopathology, Mandya Institute of Medical Sciences. The study was conducted for a period of 1.5 years from January 2016 to June 2017. A total of 200 cases were included in this study.

All patients presenting to the cytopathology laboratory, Department of Pathology, MIMS, Mandya during the study period with breast lesions, irrespective of age and sex, are included in the study. The FNAC procedure was explained to the patient in their vernacular language. A written consent was taken before performing the FNAC. Data regarding the age of the patient, site of involvement, size of lesion and relevant clinical history were recorded. FNA was done using a 22 to 23 gauge needle and 10ml disposable syringe mounted on Franzen's handle. On an average 4 smears were prepared on. Few smears were kept for wet fixation in a Coplin jar containing methanol and few slides were air dried. Wet fixed smears were stained with Haematoxylin and Eosin stain and air dried smears were stained with Leishman's stain. Histopathological examination of the available biopsies from the study was done. The biopsy specimens were fixed in 10% formalin for 24 hours and then grossed. The gross and cut section findings were noted. Several bits were taken from appropriate sites for processing and paraffin embedding. From each block, sections were cut at 4-5 microns thickness and stained with Haematoxylin & Eosin stain for histopathological examination under light microscope.

Inclusion Criteria

All patients presenting to the cytopathology laboratory, Department of Pathology, MIMS, Mandya during the study period with breast lesions, irrespective of age and sex, are included in the study.

Exclusion Criteria

Uncooperative patients, repeat FNAC patients, patients with diagnosed breast malignancy on treatment and patients with recurrent breast malignancy were excluded from the study.

RESULTS

The present study includes fine needle aspirates (FNAs) from the palpable breast lesions of 200 cases spread over a period 1.5 years from January 2016 to June 2017 at the Department of Pathology, Mandya Institute of Medical Sciences, Mandya. All the lesions were categorized into 5 categories C1 through to C5 as per National Cancer Institute (NCI) reporting criteria- C1 (inadequate), C2- (benign), C3 (atypia probably benign), C4 (suspicious of malignancy), C5 (malignant). Out of 200 cases of breast FNACs evaluated, histopathological correlation were available for 88 cases and statistical tests were used to interpret the results. Among

200 cases two cases were inadequate for evaluation, 160 cases were benign, three cases were diagnosed as atypia probably benign, one case was diagnosed as suspicious of malignancy and 34 cases were diagnosed as malignant. Out of 34 malignant cases, majority of cases were in the age group of 41 to 50 years followed by 31 to 40 years. Only one case was found to be in age group of 81 to 90 years. (Table 1).

Age		Frequency	Percentage
Valid	21-30	3	8.8
	31-40	6	17.6
	41-50	14	41.2
	51-60	5	14.7
	61-70	5	14.7
	81-90	1	2.9
	Total	34	100.0

Table 1. Age Distribution of C5-Malignant Breast Lesions

	Frequency	Percentage
C5 - Infiltrating ductal carcinoma	28	82.4
C5 - Medullary carcinoma	1	2.9
C5 - Metaplastic carcinoma	1	2.9
C5 - Mucinous carcinoma	3	8.8
C5 - Papillary carcinoma	1	2.9
Total	34	100.0

Table 2. Cytological Diagnosis of C5 Lesions

Majority of lumps were located on left side of breast (19=55.9%) while 15 lumps were located on right side. Among 34 cases, 16(47.1%) cases were located in upper inner quadrant followed by 12 cases in upper outer quadrant, 3 cases in lower inner quadrant, 2 cases were diffuse involving all quadrants of breast and one case was located in lower outer quadrant. Of the 34 malignant cases, 28 were reported as Infiltrating Ductal Carcinoma, Not Otherwise Specified (NOS) type, three cases were reported as mucinous carcinoma breast on cytology, one case was reported as medullary carcinoma breast, one case was reported as papillary carcinoma breast and one case was reported as metaplastic carcinoma breast on cytology. (Table 2). Of the 34 malignant cases, 28 were reported as infiltrating ductal carcinoma, Not Otherwise Specified (NOS) type. Smears on cytology were moderately to highly cellular and showed loosely Cohesive sheets and clusters of pleomorphic ductal epithelial cells. Cells showed an enlarged hyperchromatic nucleus, increased nuclear cytoplasmic ratio, moderate to marked nuclear pleomorphism, coarse to granular to clumped chromatin with prominent nucleoli and irregular nuclear margins. Mitotic activity was also present. Of these 28 cases, 20 underwent a surgical procedure with the excision of the neoplasm. The cytological diagnosis of carcinoma was confirmed in all these cases. One case was reported as infiltrating ductal carcinoma on cytology was diagnosed as infiltrating lobular carcinoma on histopathology. Three cases were reported as Mucinous Carcinoma breast on cytology. On cytology, smears were moderately cellular and showed ductal epithelial cells with abundant cytoplasm arranged in clusters and singles. The cells showed moderate nuclear pleomorphism. The cells clusters were suspended in abundant mucin background. A cytological diagnosis of mucinous carcinoma was given which was followed by modified radical mastectomy. The cut section of mastectomy specimen revealed a soft grey white tumour with mucoid areas measuring 3 x 2.5 cms. Histopathology showed tumour cell clusters floating in lakes of mucus separated by delicate fibrous septae, thereby confirming the diagnosis.

			Cytological Diagnosis					Total
			C5- Infiltrating Ductal Carcinoma	C5- Medullary Carcinoma	C5- Metaplastic Carcinoma	C5- Mucinous Carcinoma	C5- Papillary Carcinoma	
Histopathological Diagnosis	Infiltrating Ductal Carcinoma	Count	20	0	0	0	0	20
		% within cytological diagnosis	95.2%	0.0%	0.0%	0.0%	0.0%	74.1%
	Infiltrating Lobular Carcinoma	Count	1	0	0	0	0	1
		% within cytological diagnosis	4.8%	0.0%	0.0%	0.0%	0.0%	3.7%
	Invasive papillary Carcinoma	Count	0	0	0	0	1	1
		% within cytological diagnosis	0.0%	0.0%	0.0%	0.0%	100.0%	3.7%
	Medullary Carcinoma	Count	0	1	0	0	0	1
		% within cytological diagnosis	0.0%	100.0%	0.0%	0.0%	0.0%	3.7%
	Metaplastic Carcinoma	Count	0	0	1	0	0	1
		% within cytological diagnosis	0.0%	0.0%	100.0%	0.0%	0.0%	3.7%
	Mucinous Carcinoma	Count	0	0	0	3	0	3
		% within cytological diagnosis	0.0%	0.0%	0.0%	100.0%	0.0%	11.1%
Total		Count	21	1	1	3	1	27
		% within cytological diagnosis	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Table 3. Cytological Diagnosis of C5 Breast Lesions with Histopathological Correlation

Malignant Cases in Cytology	Number of Cases Biopsied	Sensitivity	Specificity
34	27	100%	100%

Table 4. Statistical Analysis of Malignant Lesions

One case was reported as Medullary Carcinoma breast on cytology. Cytology smears showed pleomorphic ductal epithelial cells in syncytial pattern, clusters and singles. The cells had hyperchromatic nuclei with prominent nucleoli against lymphoplasmacytic background. Based on this, surgery was undertaken and the diagnosis was confirmed at histopathology. One case was reported as papillary carcinoma breast on cytology. Smears on cytology were cellular and features were suggestive of papillary carcinoma which was followed by surgery. Histopathology showed a cellular tumour comprised of pleomorphic ductal epithelial cells arranged predominantly in papillary pattern with fine fibrovascular core invading into stroma. The papillae were lined by tumour cells with high nucleocytoplasmic ratio, hyperchromatic nuclei along with areas of haemorrhage and necrosis. One case was reported as metaplastic carcinoma breast on cytology. Cytology smears showed mixed population of malignant ductal epithelial cells of variable

morphology and spindle cells which was followed by surgery. Histopathology showed pleomorphic malignant epithelial cells, spindle cells. Among these 34 cases, 27 cases were available for histopathological correlation which proved to be malignant on histopathology also. (Table 3). Therefore, FNAC proved to be 100% sensitive and specific in the diagnosis of malignant lesions in our study. (Table 4).

DISCUSSION

Fine-needle aspiration cytology is widely used in the diagnosis of breast cancer because it is an excellent, safe, and cost-effective diagnostic procedure. FNAC of the breast can reduce the number of open breast biopsies.[12] Our study included 34 cases with palpable breast lumps in which cytomorphological features of malignant breast lesions were studied in detail and the cytological results were subsequently compared with that of histopathology in available cases. In C5 category, 34 (17%) cases were reported as malignant lesions presenting most commonly in age group of 41-50 years, among which 28 (82.4%) cases were ductal carcinoma (most common). Rahman et al[13] and Khemka A[14] reported 14.17% and 22% of malignant cases respectively which were close to our study. However Singh A[15] reported a lower incidence of 8.82% while Bukhari et al[12] reported a higher rate of 31% cases of malignant lesions. (Table 5).

Study	Number of Cases (%)	Peak Age Group
Singh A	8.82%	41-60
Rahman MZ et al	14.17%	31-40
Bukhari et al	31%	51-60
Khemka A	22%	40-44
Present study	17%	41-50

Table 5. Comparative Analysis of Malignant Breast Lesions

Name of the Study	Sensitivity	Specificity
Rupom TU	100%	100%
Pudasaini S	93%	100%
Present study	100%	100%

Table 6. Comparison of Statistical Data in Malignant Breast Lesions

One case was reported as medullary carcinoma by FNAC and histopathology. This is similar to study done by Kanchana P. V. N et al who had reported 2 cases of medullary carcinoma.[16] One case of papillary carcinoma has been reported in this study by FNAC and histopathology which is a rare tumour of breast comprising less than 1-2% of all newly diagnosed cases of breast.[17] This is similar to study done by Deepti A who had reported 1 case of papillary carcinoma breast.[18] Three cases were diagnosed as mucinous carcinoma by FNAC and histopathology. In the study done by S. Srikanth one case of mucinous carcinoma was reported on cytology.[19] One case was diagnosed as metaplastic carcinoma by FNAC and histopathology. Akshay A.A, Manisha Y.T, Reeta D reported one case of metaplastic carcinoma on cytology.[20] In malignant lesions, we found 100% sensitivity and 100% specificity which were similar to the values of the study done by Rupom TU.[21]

CONCLUSIONS

Fine needle aspiration cytology is an efficient, rapid, inexpensive, safe and reliable diagnostic method. It causes minimum morbidity with very less complications and has excellent patient acceptance. It helps in deciding the mode of surgery. In spite of its few limitations, FNAC has high levels of diagnostic accuracy when it is performed by an experienced pathologist. The high specificity and high negative predictive value for malignancy illustrated the high accuracy of FNAC in the diagnosis of malignancy in the breast. Therefore, we conclude that the diagnosis of breast lesions based on FNAC should be practiced as a routine procedure as there is high degree of correlation with histopathological findings. Thus, FNAC is an effective and valid tool as the first line diagnostic modality in the preoperative diagnosis and management of both benign and malignant breast lesions.

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