



ISSN (P): 2617-7226
ISSN (E): 2617-7234
www.patholjournal.com
2019; 2(2): 01-04
Received: 01-05-2019
Accepted: 22-05-2019

Dr. Kaushal Bhojani
Assistant Professor, Pathology
Department, PDU Medical
College, Rajkot, Gujarat, India

Dr. Gauravi Dhruva
Professor & Head, Pathology
Department, PDU Medical
College, Rajkot, Gujarat, India

Breast lesions cytology and correlation with histopathology

Dr. Kaushal Bhojani and Dr. Gauravi Dhruva

DOI: <https://doi.org/10.33545/pathol.2019.v2.i2a.01>

Abstract

Background: Breast carcinoma is the leading cause of death due to cancer in women. It is difficult to determine whether a lump is benign or malignant from clinical assessment. Fine needle aspiration cytology (FNAC) is a convenient and rapid procedure. Present study was carried out to correlate fine needle aspiration cytology and histopathology of breast lesions.

Methods: A study consisting of fine needle aspiration cytology (FNAC) 201 of breast lesions and their histopathological correlation was conducted at tertiary care hospital with medical college in over a period of one years. The diagnostic accuracy of this series was assessed and compared with data obtained from the Indian and international literature. Statistical analysis like sensitivity, specificity, positive predictive value, efficiency, and negative predictive value were carried out.

Results: The diagnostic accuracy of this series i.e. sensitivity 88.24%, specificity 100%, positive predictive value 100%, efficiency 95.52%, and negative predictive value 93.2% was compared with similar studies in literature.

Conclusions: FNAC is an effective modality for the diagnosis of breast lesions. It is a safe, simple, and cost effective outpatient procedure associated with negligible complications. It helps the clinicians for early diagnosis and specific management thus reducing morbidity and mortality.

Keywords: Breast lesions, cytology, histopathology, fine needle aspiration cytology

Introduction

Fine needle aspiration cytology (FNAC) was described and practiced by Martin and Ellis in 1930^[1].

It is a well-accepted procedure and is a valuable tool in the diagnosis and patient management of breast lesions. It has high diagnostic accuracy^[2-3]. This helps the clinician in planning the correct surgical or medical treatment. Nonetheless, some variation has been reported^[4-5].

This study was initiated to correlate fine needle aspiration cytology diagnosis and histopathology diagnosis of the breast lesions also to calculate statistical data like Sensitivity, specificity, positive predictive value, negative predictive value, and efficiency FNAC procedure.

Methods

The study was designed at Department of Pathology, PDU Medical College and Hospital, Rajkot in Gujarat, a tertiary health care centre. The study was carried during May 2018 to April 2019. Informed consent was obtained from the patient. FNAC was performed on 477 cases that came with history of breast lump. Out of these only 201 cases in which we received specimen for surgical histopathology examination, so included in the study. Remaining cases were lost to follow up, hence excluded from study.

Detailed history was obtained, followed by clinical examination. FNAC procedure was explained to the patient. Lesion fixed with one hand, with a quick single motion 24 G needle with 10 ml disposable syringe was inserted in the mass through skin. As needle enters in the mass, a change in consistency was felt. The piston of the syringe was withdrawn to apply full suction; needle was moved back and forth in the mass 3-4 passes, in different direction keeping needle in the mass. Aspirated material was taken on labeled glass slides by pushing plunges and smears were prepared. These smears were stained with Hematoxyline and Eosin method.

Correspondence

Dr. Kaushal Bhojani
Assistant Professor, Pathology
Department, PDU Medical
College, Rajkot, Gujarat, India

FNAC diagnosis given in following categories: 1) Benign, 2) Malignant, 3) Suspicious of malignancy, 4) other (non-neoplastic lesions) and 5) Inadequate to opine. Surgical specimens obtained were incisional biopsy, total excisional biopsy or modified radical mastectomies. Detailed histopathologic examination done to establish a diagnosis. Statistical analysis carried out such as sensitivity, specificity, positive predictive value, negative predictive value and efficiency were calculated.

Results

In this prospective study comprising of 201 cases with complaints of breast lump, the age of the patients ranged between 10 to 70 years, among which 195 were females and 6 were males. Cases presented with chief complaints of lump in breast, pain, skin redness, nipple retraction, nipple erosion, and nipple discharge.

On cytological examinations diagnosis was divided into 5 groups – benign, malignant, suspicious for malignancy, non-neoplastic and inadequate to opine.

Total 114 (56.25%) cases were reported as benign in which smears were highly cellular and showed large, branching, monolayered sheets of uniform benign ductal epithelial cells. Numerous single, bare bipolar nuclei of benign type and fragments of fibromyxoid stroma were seen which were showed features of fibroadenoma on histopathology

In 63 (31.50%) cases diagnosed as malignant where smears were highly cellular with single population of atypical

ductal epithelial cells, irregular angulated clusters of atypical cells, nuclear enlargement, nuclear hyperchromasia and membrane irregularity of variable degree. Cells were with intact cytoplasm, absence of single bare nuclei of benign type and presence of necrosis were also noted in the smear from these cases and infiltrating duct carcinoma after histopathology.

6 smears (03.00%) showed cytomorphological features not fulfilling the criteria of malignancy. Smears were hypercellular with cytologic pattern of monotonous ductal epithelial cells with mild to moderate high nuclear / cytoplasmic ratio and nuclear hyperchromasia and cells arranged in loosely cohesive groups with nuclear crowding. Diagnosis was offered as suspicious for malignancy in those cases.

Rest of the non-neoplastic cases showed cyto-morphological features consisted with gynaecomastia, inflammatory lesion, simple cyst, fibrocystic disease, granulomatous mastitis, and galactoceles. In three cases sample was inadequate even after repeat FNAC, on histology diagnosed as infiltrating duct carcinoma, fibrocystic disease and sclerosing adenosis respectively.

This is because of deep seated small lesion, only cystic fluid was aspirated and sclerosing component of the lesion respectively. All 134 cases were correlated with histopathology findings (Table 1). The cytological diagnoses were correlated with histopathological diagnosis and consistency calculated (Table 2).

Table 1: Cytological and histopathological diagnosis.

Cytological diagnosis	No. of cases	Histopathological Diagnosis												
		Fibroadenoma Adenoma	Sclerosing adenosis	Cystosarcoma phyllodes Phyllodes	Infiltrating duct ca.	Infiltrating lobular ca.	Ductal Ca. in situ	Granulomatous mastitis	Non sp. Mastitis	Gynaecomastia	Fibrocystic disease	Galactocoele	Hydatid cyst	Total
Benign	114	90	7	5	6	0	0	0	0	0	6	0	0	114
Malignant	63	0	0	0	60	2	1	0	0	0	0	0	0	63
Suspicious of malignancy	6	2	0	0	4	0	0	0	0	0	0	0	0	6
Fibrocystic disease	1	0	0	0	0	0	0	0	0	0	1	0	0	1
Granulomatous Mastitis	2	0	0	0	0	0	0	2	0	0	0	0	0	2
Non sp. Inflammatory	3	0	0	0	0	0	0	0	3	0	0	0	0	3
Simple cyst	3	0	0	0	0	0	0	0	0	0	2	0	1	3
Gynaecomastia	4	0	0	0	0	0	0	0	0	4	0	0	0	4
Galactocoele	2	0	0	0	0	0	0	0	0	0	0	2	0	2
Inadequate	3	0	1	0	1	0	0	0	0	0	1	0	0	3
Total	201	92	8	5	71	2	1	2	3	4	10	2	1	201

Table 2: Cytological and histopathological correlations.

Cytological diagnosis	No. of cases	Histopathological diagnosis		
		Consistent	Inconsistent	Total
Benign	114	108 (94.67%)	6 (5.33%)	114 (100%)
Malignant	63	63 (100%)	0	63(100%)
Suspicious of malignancy	6	5 (83.33%)	1 (16.66%)	6 (100%)
Other	18	16 (92.31%)	2 (7.69%)	18 (100%)
Total	201	192 (95.52%)	9 (4.47%)	201 (100%)

Table 3: Topographical distribution.

Author	Lesions of the breast						
	UO	C	UI	LO	LI	T	WB
Zuk JA	42.20	31.6	6.4	5.3	4.3	5.3	0.5
Rocha P D	45.20	30.4	7.6	5.2	4.4	2.3	0.3
Michael B	60	12	12	10	06	--	--
Present study	42.54	17.91	17.16	11.19	2.99	0.74	7.46

(UO- upper outer, C- central, UI- upper inner, LO- lower outer, LI- lower inner, T- tail, WB- whole breast)

True positive cases (TP) = 68 [consistent: 63 malignant + 5 suspicious for malignancy]

False positive cases (FP) = 01[inconsistent]

True negative cases (TN) = 124 [consistent: 108 benign + 16 others],

False negative cases (FN) = 08 [inconsistent]

Sensitivity = $TP \times 100 / TP + FN = 68 \times 100 / 68 + 08 = 89.47\%$

Specificity = $TN \times 100 / TN + FP = 124 \times 100 / 124 + 01 = 99.2\%$

Positive predictive value = $TP \times 100 / TP + FP = 68 \times 100 / 68 + 01 = 98.55\%$

Negative predictive value = $TN \times 100 / TN + FN = 124 \times 100 / 124 + 08 = 93.93\%$

Efficiency = $TP + TN / TP + FP + FN + TN = 68 + 124 / 68 + 01 + 08 + 124 \times 100 = 95.52$

Table 4: Statistical analysis.

Authors	Sensitivity (%)	Specificity (%)	Positive predictive value (%)	Efficiency (%)	Negative predictive value (%)
Stavric GD ¹⁷	95.30	97.10	---	---	---
Kline TS ⁵	89.95	92.95	85.33	91.63	---
Frable WJ ³	89.0	97.0	95.0	94.0	---
Wollenberg ²³	65.0	100.0	100.0	---	89.0
Palombini 15	95.70	89.60	95.90	94.0	---
Zuk JA ¹⁰	70.60	87.50	95.20	---	---
Sheryl LW ¹⁴	90.0	98.0	98.0	---	---
Rocha PD ²	93.80	98.21	92.70	97.40	---
Feichter GE ¹⁸	86.0	99.30	99.30	93.0	85.0
Hashemzadeh ⁷	89.79	93.47	97.77	---	89.36
Present study	89.47	99.2	98.55	95.52	93.93

Discussion

There are several reports in literature on fine needle aspiration cytology, and a good correlation between FNAC and histology has been recorded in many series. Majority cases in the study were in reproductive age group, the youngest patient was 10 years old female child. In present study maximum numbers of lumps were present in upper outer quadrant followed by central, upper inner, lower outer, lower inner quadrants, and axillary tail respectively. Lump involving whole breast contributes 7.46% cases. Malignant lesions were common in the upper quadrant (Table no.3). These findings were consistent with the studies [6-11].

The percentage of malignancy on cytology was 31.34%, the findings were similar to findings Wang HH, Gupta S K and it was less as compared to series Sheryl L W, Palombini L, Kher AV, Stavric GD and Feichter GE [12-18]. This percentage was more as compared to Rocha PD [2]. In our study one of the cases was diagnosed as malignant, three cases as gynacomastia amongst male cases.

Diagnostic accuracy for gynaecomastia & malignancy in males was, 100% similar findings also noticed by other series [19-22]. The success of cytology diagnosis was varied according to histologic subtypes. FNAC tends to be inadequate and false negative in cases of duct carcinoma of scirrhus subtype [16-22].

In the present study, sensitivity was high as compared to Wollenberg, JA Zuk and GE Feichter and almost same to Hashemzadeh [10, 18, 23, 7]. Specificity in the present study was similar to Feichter GE [18] and it was higher than other series and lower than Wollenberg [23]. Positive predictive value of present study was higher than other series & it was lower

than to Wollenberg *et al* and Feichter GE [18]. Negative predictive value of present study was higher than Wallenberg & GE Feichter [18-23].

Efficiency of fine needle aspiration cytology in the present study was lower than in the study by Rocha PD [2] and it was more than findings by WJ Frable, Palombini and GE Feichter [3, 5, 15, 18].

Conclusion

FNAC is an effective modality for the diagnosis of breast lesions. It is a safe, simple, and cost effective outpatient procedure associated with negligible complications. It helps the clinicians for early diagnosis and specific management thus reducing morbidity and mortality. It can be performed on out-patient basis and FNAC has very high sensitivity and specificity for diagnosing breast lesions.

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