ORIGINAL ARTICLE

FNAC AS PREOPERATIVE DIAGNOSTIC TOOL FOR NEOPLASTIC AND NON-NEOPLASTIC BREAST LESIONS: A TEACHING HOSPITAL EXPERIENCE

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ABSTRACT

Aims & objectives: Fine needle aspiration cytology is a quick, simple and accurate method for diagnosing different breast lesions. To study the role of FNAC as alternative to open surgical biopsy and accordingly to decide management of breast lump and also to study various cyto morphological patterns of breast lesions and compared them with histopathological examination, to determine the diagnostic accuracy of cytology.

Materials &methods: 293 cases of palpable breast lump patients were studied at the GMERS Medical College & General Hospital, Sola, Ahmedabad from April 2010 to august 2014. FNA for cytological examination was carried out in all of them. Biopsies for Histopathological study were received in 104 patients.

Results: Out of 293 cases studied, on cytology 211 cases were diagnosed as benign breast lesions, 29 cases were reported as atypical/suspicious morphology and 49 cases were diagnosed as malignant breast lesions. Biopsy specimen were received in 104 cases. The sensitivity, specificity, positive predictive value, negative predictive value and accuracy were 94%,98.5 %,97 %,97 % and 97% respectively.

Conclusion: FNAC is simple, rapid, highly sensitive and specific, cost effective method in the evaluation of the breast lesions. It is helpful in decreasing radical and invasive surgical procedures particularly in non-neoplastic breast lesions.

Key words: FNAC, Breast lesions, Carcinoma of Breast

INTRODUCTION

Today with increasing health and cosmetic awareness, breast lesions have been concealed by most of the population. Breast diseases must be dealt with care as they are not only medical problem but create social stigma as well. Spectrum of lesions of breast is wide ranging from non-neoplastic lesions to high grade carcinomas.[1,2]

The FNAC procedure is simple, rapid, minimally invasive and cost effective. FNAC has high sensitivity, specificity and diagnostic accuracy. [3,4,5,6,7] Most of the non-neoplastic lesions of breast presenting as breast lump appear neoplastic, making clinical diagnosis difficult. FNAC helps in avoiding unnecessary surgical interventions like diagnostic excision or incisional biopsy. [8,9,10] FNAC is very well established as a diagnostic modality for elucidating the etiology of breast lumps and definitive therapy is instituted on the basis of its results. [11]

The primary goal of aspiration cytology is to separate malignant lesions that require more radical therapy from benign ones that may be conservatively managed. [12] The objective of the present study is to study cyto morphological pattern of various neoplastic and non-neoplastic lesions of breast and to study the utility of FNAC as preoperative minimal invasive diagnostic procedure.

MATERIALS & METHODS:

This is a retrospective study done from April 2010 to august 2014 at GMERS Medical College &

Hospital, Sola. The outdoor and indoor patients presented with breast lump were included in the study. 293 cases presented with breast lump were studied. FNAC was performed after obtaining written consent in all the 293 patients. Fine needle aspiration was performed with 23-25 gauge needle & 10cc syringe. [13] The smears were fixed in methanol for 30 minutes and stained with H & E.Special stains like ZN stain, PAS stain etc was done whenever necessary. Morphological evaluation was done for sample adequacy, cellularity, and diagnostic interpretation.

Biopsy specimen were received in 104 cases. The surgical specimens received were evaluated grossly, and trimming was done according to the procedure described by Rosai. [14] The sections were taken from representative areas. The tissue was fixed in 10% buffered formalin and then processed by the routine paraffin embedding techniques. [15] Sections were cut at 4-5 microns thickness and stained with hematoxylin and eosin. Correlation between cytological and histological diagnosis were done. [16] Cytomorphological findings were correlated with histological findings and accuracy of diagnosis was assessed by calculating sensitivity, specificity, predictive values, and false negative and false positive rates.

RESULTS:

Out of total 293 patients studied, 211(72%) cases were benign and in the range of 20-35 years of age. 49 (16.7%) cases were diagnosed malignant with range of 40-55 years of age. Out of 293 cases, biopsies were available in 104 cases for histopathology. In order to ensure uniformity in the diagnostic reporting, the National Cancer Institute (NCI) has developed and recommended five categories for assessing and reporting of palpable breast lesions. The five categories for reporting of these lesions are: Inadequate smear (C1), benign (C2), suspicious probably benign (C3), suspicious probably malignant (C4) and malignant (C5). [17]

There is one case diagnosed as inadequate smear, found to be benign on histology. ut of 64 cases, 63cases were confirmed on histology to be benign and one as malignant.

In C3 category we diagnosed 05 cases as benign with atypia, 04 cases were diagnosed as benign and one malignant, 8 cases from 9 suspicious (C4) and of C5 (malignant) category all 25 cases confirmed as malignant cases.

Table 1: Distribution of Cytological diagnosis of Breast lesions

Cytology diagnosis	Cases (%)
C1 (Inadequate)	04 (1.36)
C2 (Benign)	211 (72)
C3 (Benign with atypia)	10 (3.4)
C4 (Suspicious)	19 (6.5)
C5 (Malignant)	49 (16.7)
Total	**293**

Table 2: Cytological diagnosis were correlated with histopathological findings in 104 cases

Cytology diagnosis	Cases	Histopathology diagnosis	
		Benign	Malignant
C1(Inadequate)	01	01	-
C2(Benign)	64	63	01
C3(Benign with atypia)	05	04	01
C4(Suspicious)	09	01	08
C5(Malignant)	25	-	25
Total(cytology)	**104**		**104**

Table 3: Cytology and histology correlation of benign diseases of breast:

Histological diagnosis	C1	C2	C3	C4	C5	Total
Fibroadenoma	01	46	02	-	-	49
Fibrocystic breast disease	-	02	01	-	-	03
Benign phyllodes	-	01	01	-	-	02
Lactating changes	-	-	-	-	-	00
Tubular adenoma	-	01	-	-	-	01
Abscess/Inflammation	-	07	-	-	-	07
Fat necrosis	-	02	-	-	-	02
Adenosis	-	-	-	01	-	01
Gynecomastia	-	01	-	-	-	01
Duct ectasia	-	01	-	-	-	01
Nodular hydreadenoma	-	01	-	-	-	01
Normal breast tissue	-	-	01	-	-	01
Total	01	62	05	01	00	69

Table 4: Breast cytology and histology correlation of malignant lesion

Histological diagnosis	C2	C3	C4	C5	Total
Invasive ductal carcinoma(NOS)	01	01	07	21	30
Invasive lobular carcinoma	-	-	-	01	01
Comedo Carcinoma	-	-	-	02	02
Malignant Phyllodes	-	-	-	01	01
Mixed Mucinous and Ductal carcinoma	-	-	01	-	01
Total	01	01	08	25	35

NOS: Not otherwise specified.

Out of 104 cases, on cytology, 16 cases diagnosed as non-neoplastic and 87 cases diagnosed as neoplastic and one as inadequate. Out of 104 cases, 10 cases were diagnosed as non- neoplastic, 94 cases as neoplastic on histology. **(Table2)**

The correlation of the various benign and malignant histological subtypes and their initial ytologycal diagnosis are depicted in Tables 3 and 4, respectively.

The most common benign histological subtype was fibroadenoma (47%), followed by abscess/inflammation (6.7%) and fibrocystic breast disease (2.8%). The most frequent malignant histological subtype seen was invasive ductal carcinoma (28.8%) while the least common types included invasive lobular carcinoma, malignant phyllodes, mixed mucinous and ductal carcinoma. **[Table 3 and 4]**

The aggregated results are shown in Table 5. The sensitivity, specificity, positive predictive value, and negative predictive values were calculated from this information. Chi-square test revealed P value<0.001.

Table 5: statistical analyses

FNAC diagnosis	Histopathology Diagnosis	
	Benign	Malignant
Benign/Atypia	67 (TN)	02 (FN)
Suspicious/Malignant	01 (FP)	33 (TP)

*One case of inadequate material was excluded.
TN: True negative, FN: False negative, FP: False positive, TP: True positive

Sensitivity=94% (Sensitivity is statistical index of diagnostic accuracy of that test)

Specificity=98.5%
Positive predictive value=97%
Negative predictive value=97%
Efficiency for malignant lesion =97%.

In present study, cytohistological correlation for non-neoplastic lesion is very significant with 93.5% sensitivity and 100% specificity to diagnose neoplastic lesions. Cytology helped in avoiding unnecessary invasive surgical intervention in 79% of non-neoplastic cases. The positive predictive value for cases diagnosed as malignant were 100%, 88.89% for suspicious cases, and 20% for atypical cases.

DISCUSSION

FNAC is a minimal invasive procedure, very feasible option for avoiding unnecessary surgical intervention. Nowadays as people are more aware for cosmetic reasons, FNAC is really a best preoperative diagnostic tool in breast palpable lesions. Obtaining preoperative diagnosis is desirable when dealing with breast cancer, as it gives patient a chance to come to terms and for discussions of treatment options for therapeutic rather than a diagnostic operation.

This study performed FNAC over 293 cases. Maximum number of benign breast disease fall in age group of 20-35 years & malignant cases in 40-55 age group.

In 104 cases tissues were available for histological study. Various benign, atypical or suspicious and malignant breast lesions were studied with their cyto-histological correlation and statistical analysis was done.

Excluding the equivocal suspicious cytology reports (C3 and C4 cases) and correlating the definitive benign (C2) and malignant (C5) cytology reports (total of 89) with their confirmatory tissue diagnoses, the measure of accuracy of FNAC of the breast cytology were determined with an absolute sensitivity of 96%, a specificity of 100%, a PPV (C5) of 100% and a NPV (C2) of 98%.FNR is 4%, FPR is 0%. These values satisfy the minimum requirement for breast cytology performance set by the UK National Health Service Breast Screening Pathology (NHSBSP). [18]

The UK NHSBSP suggested a minimum threshold for breast cytology performance as thus: Absolute sensitivity >60%, complete sensitivity >80%, full specificity >55%, PPV >98%, FNR <6% and FPR <1%.

In the present study 4 cases were reported as inadequate smears. Out of 4, one case on histology reported as fibroadenoma. As lump was very tiny and mobile, sample was inadequate for cytology diagnosis which was later on confirmed on histology. A reduction in numbers of inadequate smears can be achieved by reducing the number of aspirators. The role aspirator aside, lesions less than 2cm in size also pose a problem in sampling adequacy. Inadequate sample may require multidisciplinary review of clinical and mammographic findings to determine if repeat aspirate, core biopsy or excision biopsy is needed.

Fibroadenoma constituted the majority of benign tumors in the study. These tumors constitute the largest cause of false positive and false negative diagnoses. [17] In the present case we noted 2 false negative cases, which were seen in one case of female whose cytology was diagnosed as fibroadenoma and other was with atypia, their further follow up on histopathology was found out to be invasive ductal carcinoma.

Table 6: Comparison of cytological diagnosis with other studies

Author	Inadequate smear	Benign	Suspicious	Malignant	Other	Total
Kuldeep Singh(2001) [19]	0	200(83.33%)	5(2.08%)	35(14.58%)	0	240
Quasim et al(2009) [20]	16(13.79%)	68(58.62%)	0	32(27.58%)	0	116
Sajid(2010) [21]	0	64(52.5%)	0	58(47.5%)	0	122
Bukhari et al(2010) [22]	0	271(63.76%)	32(7.52%)	120(28.23%)	2(0.47%)	425
Neha mahajan et al(2013) [23]	0	68(64.15%)	7(6.60%)	24(22.64%)	7(6.60%)	106
Present study	**04(3.7%)**	**64(59.8%)**	**09(8.4%)**	**25(23.3%)**	**05(4.6%)**	**107**

Table 7: Comparison of accuracy of FNAC with other studies

Author	Sensitivity	Specificity	PPV	Efficiency	NPV
Francisco D et al(1995) [24]	93.49%	95.73%	93.49%	98.75%	95.73%
Feichter et al(1997) [25]	86%	99.3%	99.3%	93%	85%
Zhang Qin(2004) [26]	97.1%	97.3%	-	9.2%	-
Khemka A et al(2009) [27]	96%	100%	100%	-	95.12%
Bukhari et al(2011) [22]	98%	100%	97%	98%	100%
Neha mahajan et al(2013) [23]	96.66%	98.66%	96.77%	98.11%	98.66%
Present study	**94%**	**98.5%**	**97%**	**97%**	**97%**

PPV=Positive predictive value; NPV=Negative predictive value

Our study data and statistical analysis were very much significantly comparable to other studies. **[Table 6,7]**

False positive diagnosis should be avoided because mastectomy or other treatments may in certain centers be performed based entirely on cytology findings. In the present study we found 1 false positive case. It was diagnosed as suspicious for malignancy on cytology which further underwent simple biopsy and histopathologically was diagnosed as micro glandular adenosis.

Diagnostic dilemmas arise from hypocellularity of smears and benign looking appearance of the cells. However, large numbers of dispersed epithelial cells with intact cytoplasm exhibiting intracytoplasmic lumina, nuclear irregularities, tendency to form single files and small clusters of cells with slightly enlarged nuclei are features aiding diagnosis. [17]

All the international studies done also obtained high sensitivity and specificity, thus highlighting the usefulness of FNAC as a pre-operative diagnostic tool in the management of palpable breast lesions. [17]

Criteria for adequacy during cytology reporting if cut off to 6 epithelial cell clusters reduces the false negative rates by approximately 50 %. [23]

The sensitivity, specificity, positive predictive value, negative predictive value and accuracy was 94%,98.5 %,97 %,97 % and 97 % respectively. The positive predictive value for cases diagnosed as malignant were 100%, 88.89% for suspicious cases, and 20% for atypical cases.

The high specificity and predictive value of FNAC makes it most desirable preoperative diagnostic tool for palpable breast lesions.

CONCLUSION

FNAC not only for medical problem, but for cosmetic purpose also is very cost-effective, less time consuming pre-operative diagnostic test with optimum accuracy associated with multidisciplinary review like clinical examination and mammographic findings. In our study FNAC provides highly efficient preoperative diagnosis (97%) in breast lesions. FNAC is helped to avoid surgical interventions in 79% cases in our study.

Now-a-days, neoadjuvant chemotherapy is increasingly being offered to the patients with invasive breast carcinoma. In this regard, FNAC as an alternative to histological examination is an important denominator for planning of management in institutions with limited facilities. Experience gained from this study further advocates that FNAC could be an ideal method for follow-up of malignant cases, especially when there is recurrence. FNAC can reduce significant morbidity and mortality of patients by making an early diagnosis. We recommend utility of FNAC as first line preoperative procedure for early diagnosis & management of all palpable breast lesions.

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