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Original Research Article

Role of Fine Needle Aspiration and its Diagnostic Utility in Breast Lesions in Correlation with Histopathological Examination in a Tertiary Care Hospital

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Abstract:

Background: FNAC is a valuable, rapid, accurate and cost-effective diagnostic tool in breast lesions with excellent patient acceptance and low or no morbidity. It guides the surgeons to plan further treatment in most cases without proceeding for biopsy

Objective: This study was designed to evaluate the role and diagnostic utility of FNAC in breast lesions in correlation with histopathological examination

Materials and methods: This is a prospective study conducted in the department of pathology in GMKMCH, Salem from the period of November 2016 to June 2018 after getting approval from the institutional ethical committee. All patients of all age groups of both genders were included in the study. The results of FNAC were correlated with histopathological diagnosis and the data was analyzed with IBM.SPSS Statistics Software 23.0 Version.

Results: In this study the sensitivity of FNAC was found to be 86.21%, the specificity was 95.83%, Positive predictive value was 96.15%, Negative predictive value was 85.19% and accuracy was 91.02%.

Conclusion: This study has concluded that FNAC has a high degree of sensitivity, specificity and accuracy in the diagnosis of breast lesions.

Keywords: Breast lesions, Fine needle aspiration cytology, Sensitivity, Specificity, Accuracy and diagnostic utility.

Introduction

Fine needle aspiration cytology is an established, cheap, cost effective and highly accurate method used for the diagnosis of breast lesions in present days. All the breast lesions we are encountering are not cancer and all the benign lesions do not transform into malignancy. There are a wide variety of breast lesions comprising the most common benign lesion, Fibroadenoma and the most common malignant lesion, infiltrating ductal carcinoma. Fibroadenoma accounts for about 68% of all breast lesions and has an overall incidence of 2.2% worldwide [2]. GLOBOCAN 2018 says breast cancer is the most common malignancy in women with an incidence being 20,88,849 new cases worldwide and 1,62,468 new cases in India and in the year 2018, the total number of deaths due to breast cancer is 6,26,468 worldwide and 87,090 in India. There is an increasing anxiety and stress among the women who are having a breast lesion and they seek medical advice to know whether it is a benign or malignant lesion. But it is very difficult to arrive at an accurate diagnosis by clinical examination alone and therefore the major responsibility of surgical pathologists is to differentiate benign and malignant breast lesions so that the surgeons can avoid unnecessary mastectomies. Triple test of the breast lesions including Clinical examination, Mammography and FNAC has nowadays reduced the burden of Surgeons in the early diagnosis of breast lesions. Fine needle aspiration is the most common modality used in diagnosing palpable breast lumps [3]. FNAC

is a quicker, easier and cheaper method but still has a high rate of sensitivity and specificity in diagnosing breast lesions. So this study was conducted to evaluate the diagnostic utility of FNAC in breast lesions in GMKMCH, Salem.

Materials and Methods.

This study is a prospective study conducted in the department of pathology in Govt Mohan Kumaramangalam medical college, Salem from November, 2016 to June 2018 after getting approval from the institutional ethical committee. All patients of both genders of all age groups presenting with breast lesions to the department of surgery and referred to the department of Pathology were included in the study.

After getting informed consent from the patients and after explaining the procedure, Fine needle aspiration cytology was performed using 23 Gauge needle and 5 ml or 10 ml disposable syringe. No anaesthesia was given. After recording the findings of inspection and palpation and sterilizing the area, the needle was introduced into the lesion and multiple back and forth movements given in different directions creating a negative pressure.

After getting adequate material the negative pressure was released and the syringe was slowly taken out of the lesion. Then the aspirated material was transferred to one end of a clean wiped slide and spread with another clean slide with a gentle pressure. All the smears made were fixed with isopropyl alcohol and stained with haematoxylin & eosin and Pap stain. The smears were reported and taken for statistical analysis under the following categories in accordance with the recommendations of United Kingdom national health services breast screening programme (NHSBSP) C1- insufficient material, fewer than five epithelial cell groups, C2- cells present all benign, no suspicious features, C3- Cells suspicious but probably benign, C4- Cells suspicious for malignancy probably malignant, C5- definitely malignant. The ductal carcinoma was graded using Robinson's criteria for cytological grading. The results of all FNAC were correlated keeping paraffin section diagnosis as the gold standard. The data collected were analysed with IBM.SPSS Statistics software 23.0 Version.

Results.

54 cases who turned after FNAC for biopsy in GMKMCH, Salem from the period of November 2016 to June 2018 were taken into study. Of the 54 cases studied, only 1 was male and maximum patients were between the age group of 31-40. Majority of the cases presented with only breast lump. The actual patients presented with only breast lump were 37 (68.51%),those who presented with lump and pain were 7(12.96%), lump and nipple discharge were 2(3.70%),lump and lymphadenopathy were 4(7.40%), lump, pain and lymphadenopathy were 2 (3.70%),lump, lymphadenopathy and nipple retraction was 1(1.85%) and lump, discharge and nipple ulceration was 1 (1.85%).

Table 1:

Presentation	No. Of Cases	Percentage
Lump only	37	68.51%
Lump and pain	7	12.96%
Lump and lymphadenopathy	4	7.40%
Lump and Nipple discharge	2	3.70%
Lump, pain and lymphadenopathy	2	3.70%
Lump, nipple retraction and lymphadenopathy	1	1.85%
Lump, discharge and nipple ulceration	1	1.85%

Table 2:

Size (Cm)	FAS	FAD	Gynaecomastia	Phyllodes	DCIS	Invasive Carcinomas
<5	1	18	-	1	1	17
5-10	-	1	1	4	1	5
11-15	-	-	-	1	-	-
16-20	-	-	-	1	-	-

FAS- Fibroadenosis, FAD-Fibroadenoma, DCIS-Ductal Carcinoma in Situ

The lesions which were less than 5 cm were most commonly found to be fibroadenomas and the lesions above 10 cm were confirmed as phyllodes tumours. Growth was not made out in two cases,one of which is a lobular carcinoma and the other treated by chemotherapy. The aspirated smears were reported and taken for statistical analysis under the following categories in accordance with the recommendations of NHSBSP, C1- insufficient material, fewer than five epithelial cell groups, C2- cells present all benign, no suspicious features, C3- Cells suspicious but probably benign, C4- Cells

suspicious for malignancy probably malignant, C5-definitely malignant.

Table 3:

Diagnosis	No. of cases	Percentage
Fibroadenoma	14	25.92%
Fibrocystic disease	1	1.85%
Fibroadenosis	1	1.85%
Gynaecomastia	1	1.85%
BPBD without atypia	3	5.55%
BPBD with atypia	3	5.55%
Features suspicious of malignancy	3	5.55%
Smear positive for malignancy	6	11.11%
F/S/O ductal carcinoma	14	25.92%
F/S/O lobular carcinoma	1	1.85%
F/S/O mucinous carcinoma	1	1.85%
Benign phyllodes	4	7.4%
Borderline phyllodes	2	3.7%

BPBD- Benign proliferative breast disease

After Fine needle aspiration Cytology, 14 cases (25.92%) were reported as Fibroadenoma, 1(1.85%) case as Fibroadenosis,1(1.85%) as Fibrocystic disease, 3 Cases(5.55%) were reported as benign proliferative breast disease without atypia, 3 cases(5.55%) were reported as benign proliferative breast disease with atypia, 1(1.85%) case was reported as Gynaecomastia, 3 cases (5.55%)had features suspicious of malignancy, 6 smears (11.11%) were positive for malignancy, 14 smears (25.92%) showed features suggestive of ductal carcinoma, 1 (1.85%)smear showed features of lobular carcinoma, 1 showed (1.85%) features of mucinous carcinoma, 4(7.40%) were reported as benign phyllodes and 2 (3.7%) as borderline phyllodes. The most common benign lesion detected by FNAC in this study is Fibroadenoma and the most common malignant lesion is Ductal Carcinoma. Among the 14 cases of Ductal Carcinoma, three cases fell under grade 1 and eleven cases fell under grade 2 by ROBINSON's criteria. As per table no.3, there were no cases under C1 category, 14 cases of fibroadenoma, 1 case of fibrocystic disease, 1 case of fibroadenosis, 1 case of gynaecomastia, 3 cases of BPBD without atypia, 4 cases of benign phyllodes, totally 24 cases were categorized under C2, 3 cases of BPBD with atypia under C3,2 cases of borderline phyllodes and 3 cases which had features suspicious of malignancy were categorized under C4 and 14 cases with features suggestive of ductal carcinoma, 1 case with features suggestive of lobular carcinoma, 1 case with features suggestive of mucinous carcinoma and 6 cases which showed features positive for malignancy, totally 22 cases were categorized under C5.

For the purpose of statistical analysis, the cases reported by FNAC were categorized under C1 to C5 as already mentioned. Both C2 and C3 were clubbed and C4 and C5 were clubbed together. 1 case in which there was no residual tumour after chemotherapy was excluded and not taken for statistical analysis. 4 cases which were reported as benign lesions by FNAC were proved to be malignant in paraffin sections. 1 case which was diagnosed as malignant by FNAC was proved to be benign by paraffin sections. Fine needle aspiration cytology had a sensitivity of 86.21% specificity of 95.83%, positive predictive value of 96.15%, and negative predictive value of 85.19% and accuracy of 91.02%. Following paraffin sections 17 (31.4%) cases were reported as fibroadenoma, 1 was reported as fibroadenosis, 1 as fibroadenoma with usual epithelial hyperplasia, 1 as fibroadenoma with fibrocystic disease, 1 case as gynaecomastia, 3 cases as benign phyllodes, 3 as borderline phyllodes and 1 as malignant phyllodes, 2 cases were diagnosed as DCIS with focal invasion. About 17 cases were reported as IDC- NST and 1 as IDC with medullary features. Two cases of Invasive papillary carcinoma were reported and each 1 case of mucinous, medullary and lobular carcinoma was reported. Paraffin sections also confirmed that the most common benign lesion is fibroadenoma and the most common malignant lesion is Invasive ductal carcinoma. 18 cases reported as grade II and 1 case as grade I by modified Bloom Richardson's grading system.

Table 4:

FNAC	No Of Cases	Paraffin Section		FP	FN	SEN	SPE	PPV	NPV	Accuracy
		Benign	Malignant			86.21 %	95.83 %	96.15 %	85.19 %	91.02%
Benign	27	23	4	-	4					
Malignant	26	1	25	1	-					

FP- False positivity, FN- False negativity, SEN- Sensitivity, SPE- Specificity, PPV-Positive predictive value, NPV- Negative predictive value

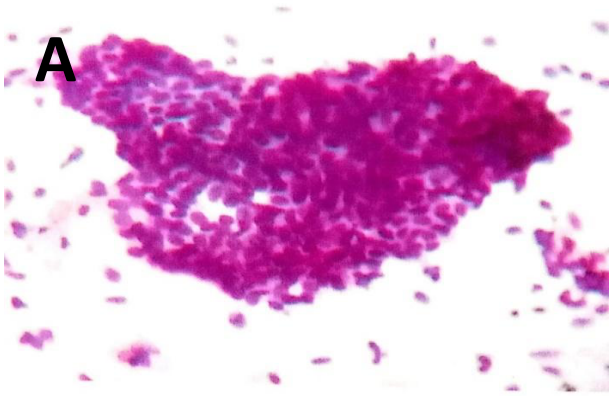

Fig-A: FNAC of benign proliferative breast disease showing cohesive clusters of ductal epithelial cells and bare bipolar nuclei in the background (H&E, 10X)

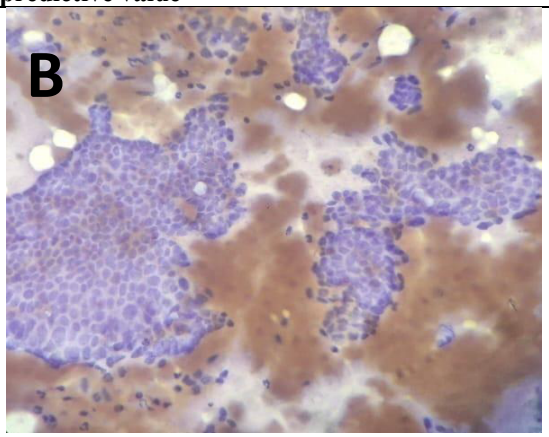

Fig-B: FNAC of benign proliferative breast disease showing papillaroid clusters of ductal epithelial cells (H&E),40X

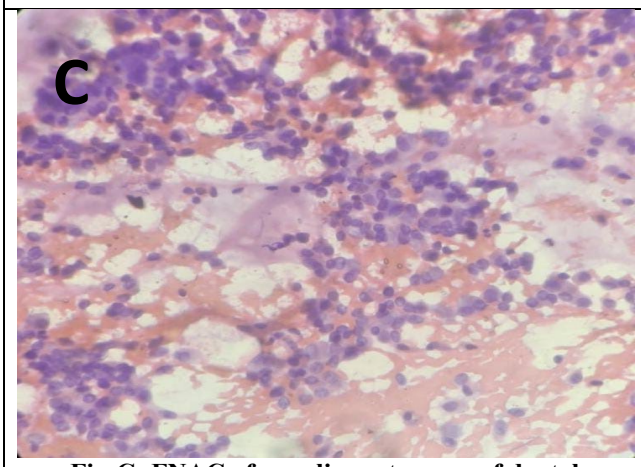

Fig-C: FNAC of a malignant smear of ductal carcinoma showing discohesive clusters of malignant ductal epithelial cells (H&E, 40X)

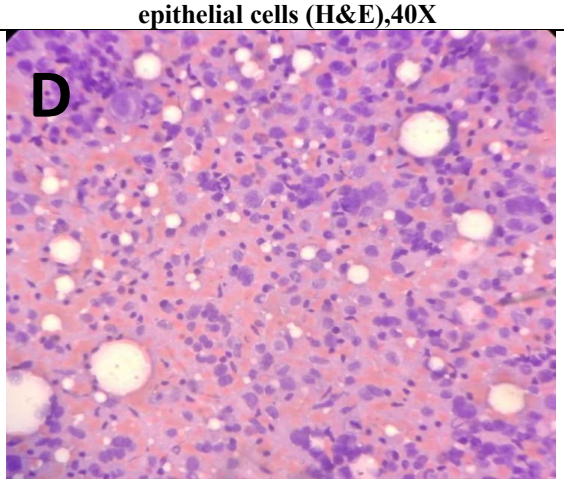

Fig-D: FNAC of a malignant smear of ductal carcinoma showing singly scattered plasmacytoid cells with plenty of lymphocytes in the background (H&E, 40X)

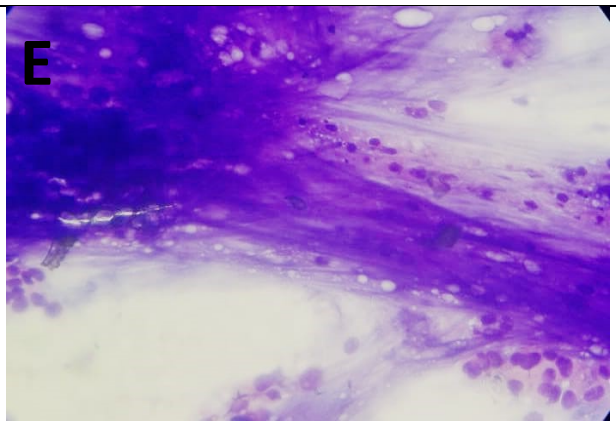

Fig-E: FNAC of mucinous carcinoma with aggregates of bland cells in pools of mucin (H&E, 0X)

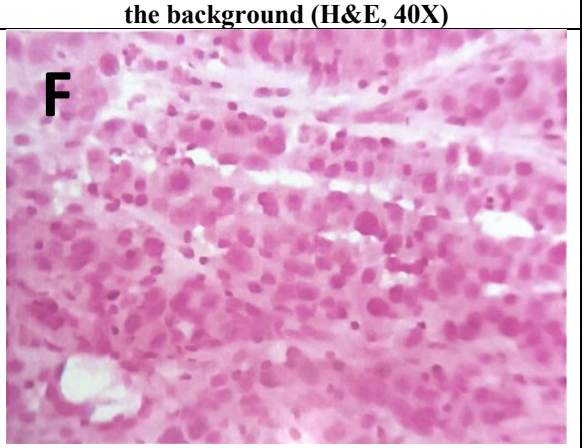

Fig-F: Paraffin section of Infiltrating ductal carcinoma showing tumour cells arranged in tubules and sheets. (H&E, 10X)

Figure 1:

Discussion

As FNAC is an excellent, cost effective, safe and quicker procedure it is widely used in the early diagnosis of breast lesions. FNAC has a high degree of accuracy, shorter turn-around time and it is a less invasive procedure than tissue biopsy. It also reduces the number of open breast biopsies and helps surgeons to avoid unnecessary mastectomies. In this study conducted to evaluate the diagnostic utility of FNAC in breast lesions, females were most commonly affected and this is in concordance with the study conducted by Charusheela Gore et al [4], Shah Alam sheikh et al [5], David E Ibukinle et al [6] and Asha mahadevappa et al [7]. The most common age group affected ranged from 31 to 40 years. The study conducted by Asha Mahadevappa et al [7] also showed the same results. In our study, the benign lesions were common in the age group 20-30 years and malignant lesions were common above 40 years. This is in concordance with the studies of Asha Mahadevappa et al [7] and Shah Alam sheikh et al [5]. The most common presentation in this study is lump only (68.51%) followed by lump and pain (12.96%). These results are similar to that of the study conducted by Asha Mahadevappa et al [7].

The main causes of inadequate smears are lack of technical experience and errors in preparation and fixation of the smears. In the present study, the percentage of inadequacy is nil whereas the frequency of inadequacy was variable in different studies ranging from 0 to 57.2% due to various factors. According to a study conducted by Shoba et al [10], out of 50 cases of breast lesions Fibroadenoma (52%) was the most common benign lesion reported and Ductal carcinoma was the most common malignant lesion reported. In our study also, the most common benign lesion encountered was Fibroadenoma (52%) and the most common malignant lesion was Ductal carcinoma (50%).

Table 5:

Sl.no	Authors	Benign		Malignant	
		Fibroadenoma	Others	Ductal Carcinoma	Others
1.	Pinto et al [8] (2004)	75.1%	24.9%	97.6%	2.4%
2.	Ashwin et al [9] (2015)	40%	60%	90.8%	9.2%
3.	Shoba et al [10] (2017)	58%	42%	100%	0%
4.	Anshulekha et al [11](2018)	45%	55%	92%	85%
4.	This study	52%	48%	54%	46%

Our study showed a relatively good sensitivity, specificity, positive predictive value and negative predictive value and diagnostic accuracy in concordance with the other studies conducted by Y.D. Choi et al in the year 2014 [12], Mulazim Hussain et al in the year 2011 [13], Ashwin et al [9] in the year 2015, Shah alam sheikh et al [5] in the year 2016 and Anshulekha patel et al [11] in the year 2018.

Table 6:

Sl.no	Authors	Sensitivity	Specificity	PPV	NPV	Accuracy
1.	Y.D.Choi et al [12]	77.7%	99.2%	98.4%	88%	91.1%
2.	Mulazim Hussain et al [13]	98%	100%	100%	98%	97%
3.	Ashwin et al [9]	96.97%	100%	100%	98.63%	99.05%
4.	Shah alam sheikh et al [5]	99.11%	96.88%	97.22%	91.18%	94.29%
5.	Anshulekha patel et al [11]	97.46%	100%	100%	100%	99.02%
6.	This study	86.21%	95.83%	96.15%	85.19%	91.02%

Even though the sensitivity, specificity and accuracy were reasonably high in this study there were also some limitations. Among the 3 cases reported as benign proliferative breast disease in FNAC, 1 case was diagnosed as fibroadenosis in histopathological examination. 1 case reported as proliferative breast disease with atypia was proved to be Fibroadenoma in the final paraffin sections. Among the other 2 cases reported as proliferative breast disease with atypia, 1 was diagnosed as invasive papillary carcinoma and the other was diagnosed as DCIS. Out of 4 smears which showed features suggestive of malignancy in FNAC, 3 cases were diagnosed as IDC-NST and 1 was diagnosed as medullary carcinoma by Paraffin section study. Among the 14 cases diagnosed as ductal carcinoma in FNAC, 11 fell under grade 2 and 3 were of grade 1 by Robinson's criteria. All the three cases of grade 1 category reported in FNAC changed to grade 2 (Modified Bloom Richardson's histologic grading system) in paraffin sections.

Conclusion

Though FNAC has its own limitations like inadequate sampling, risk of tumour seeding, false positive and false negative results, it is a fast, accurate and reliable diagnostic modality for evaluating breast lumps. On strictly adhering to the principle of triple test and avoiding technical, observational and interpretative errors, the

diagnostic accuracy of FNAC can be further enhanced. This study has also proved that FNAC has a high degree of sensitivity and specificity in breast lesions and it is a valuable diagnostic tool in the early diagnosis of breast lesions with short turn-around time.

References

1. Michelle lee and Hooman T Soltanian: Breast fibroadenomas in adolescents: current perspectives: Adolescent Health, medicine and therapeutics. 2015;159-163.
2. Santen RJ, Mansel R. Benign breast disorders. N Engl J Med. 2005;353(3):275-285.
3. Pradhan M, Dhakal H: Study of breast lump of 2246 cases by fine needle aspiration, J Nepal Med Assoc, 2008;47: 205-9.
4. Charusheela Rajesh Gore, Bikash K. Singh, Shirish S. Chandanwale, Sushma G. Gurwale, Harsh Kumar, Rupali Bawikar, Indranil Dey, Imprint cytology: A boon in tissue diagnosis, Med J DY Patil Univ. 2017;10: 58-63.
5. Shah alam sheikh, Partha Pratim Singha, Siyum Ganguly, Angela Phukan, Surjya Sekhar Das, Jahnabi Das: Frozen section of breast lesions, it's correlation with FNAC and histopathology: A tertiary centre experience, Journal of Science, 2016;6(3):191-201.
6. David E. Ibikunle, John A. Omatayo, Olufemi O, Ariyibi., Fine needle aspiration cytology of breast lumps with histopathological correlation in Owo, Ondo State, Nigeria; a five-year review., Ghana Med J 2017;51(1): 1-5.
7. Asha Mahadevappa, Thattamparambil Gopalakrishnan Nisha, Gubbana V Manjunath; Intraoperative Diagnosis of Breast Lesions by Imprint Cytology and Frozen section with histopathological correlation; J Clin Diagn Res. 2017 March 11(3): 01-06.
8. Pinto RG, Kulwant S., A Statistical analysis of fine needle aspiration biopsies in palpable benign (neoplastic and nonneoplastic) breast lesions. J Cytol 2004; 21: 64.7.
9. Ashwin Pattanshetty Khageshwaran et al, Diagnostic Utility of FNAC in the Evaluation of Breast Masses., International Journal of Recent Scientific Research August 2015;6(8) 5827-5831.
10. Shoba SN, Rajashekar YR. Role of FNAC in breast lesions; Journal of Diagnostic Pathology and Oncology; Jan-March 2017; 2(1) 3-5.
11. Anshulekha Patel, Tapaswini Bhuyan, R.C. Mohanty, Raghumani Mohanty; Diagnostic utility of FNAC in breast lesions and its correlation with histopathology; IOSR Journal of Dental and Medical Sciences, February 2018;17: 31-40.
12. Y.D. Choi, Y.H. Choi, J H Lee, J H Nam, S W Juhng, C Choi. Analysis of Fine needle aspiration Cytology of breast, a review of 1297 cases and correlation with histological diagnosis. Acta Cytol 2004; 48 (6):801-806
13. Mulazim Hussain Bhukar, Madiha Arshad, Shahid Jamal, Shahida Niazi, Shahid Bashir, Irfan M. Bakshi and shaharyar. Use of fine needle aspiration in the evaluation of breast lumps; Pathology Research International. 2011/689521-10.