

Fine Needle Aspiration Cytology with Histopathologic Correlation in Breast Lesions

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Abstract

Introduction: A palpable breast lump is a common clinical problem that needs thorough evaluation by clinical examination, FNAC, mammography and biopsy if required. *Aim of the Study:* To study the accuracy of fine needle aspirations in breast diseases and compare it with histopathology. *Materials and Methods:* This was a prospective study carried out in the department of Pathology, Shadan Institute of Medical Sciences and Research Centre, Hyderabad. Fine needle aspiration cytology (FNAC) and corresponding histopathology were studied in 81 cases over a three year period. *Results:* The patient age ranged from 12 to 64 years. Non-neoplastic lesion constituted 12%, benign tumors 47% and malignant tumors 40% on FNAC. Failed aspiration was 1%. There were one false positive and four false negative cases on FNAC. This was mainly due to limitations in FNAC, both in interpretation and nature of lesion. The overall diagnostic accuracy of FNAC was 93.8% with accuracy rate of 90% in non-neoplastic, 73.7% in benign and 93.8% in malignant lesions. Overall sensitivity and specificity were 88.5% and 97.7% respectively. No significant complication was observed in any of the cases investigated by fine needle aspiration cytology. *Conclusion:* FNAC as an OPD procedure is simple and easy to perform, takes less time gives quicker results. FNAC procedure has no significant complications. It can be used for diagnosis in non-neoplastic and benign proliferative conditions with reasonably good diagnostic accuracy.

Keywords: Breast Lesions; FNAC; Histopathology Correlation.

Introduction

A palpable breast lump is a common clinical problem. The common diagnostic approach for breast lumps is the "Triple test" that includes a thorough clinical examination, mammography and FNAC of the lump [1]. Aspiration cytology of breast serves various purposes in different clinical settings. For clinically benign lesion such as fibrocystic disease, the procedure may result in disappearance of the lesion after aspiration. For clinically malignant disease, aspiration of breast mass and cytologic diagnosis

enables the physician to assess the disease more effectively [2]. The diagnosis of solid tumors of the breast by fine needle aspiration cytology is one of its most rewarding applications.

Aims and Objectives

1. To assess the diagnostic accuracy of the FNAC procedure, by comparison with histopathology in breast diseases.
2. To evaluate the sensitivity and specificity of fine needle aspirations in breast lesions.

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Materials and Methods

This was a prospective study carried out in the department of Pathology, Shadan Institute of Medical

Sciences and Research Centre, Hyderabad. Fine needle aspiration cytology (FNAC) and corresponding histopathology were studied in a total of 81 cases over a three year period. Informed consent was obtained from all the patients or guardians.

Detailed clinical history and examination were noted before performing the FNA procedure. Cytological aspiration of the breast lumps was carried out as an out-patient department (OPD) procedure.

Fine needle aspiration was carried out using a disposable 10cc syringe fitted with a 22 or 23 gauge disposable needle. Aspirates were spread on two sets of slides and fixed immediately in 95% alcohol. The slides were stained with routine hematoxylin and eosin stain and Papanicolaou stain.

The tissue material sent from the department of surgery consisted of excision biopsy, lumpectomy, simple mastectomy or radical mastectomy specimens. The tissue was fixed in 10% buffered formalin and submitted for routine histopathology processing. The slides were stained by routine hematoxylin and eosin stain and examined.

The cytology and histopathology findings were compared.

The youngest patient was 12 years old female with fibro-adenoma and oldest patient was 64 years old female with carcinoma breast.

The maximum number of cases (32%) were present in the 21-30 age group. There were only 2 (2.4 %) male patients in our study.

Table 1: Age and gender distribution of cases

Age (in years)	Male	Female	Percentage
12-20	1	17	18 (22.2 %)
21-30	1	25	26 (32.0%)
31-40	-	19	19 (23.4%)
41-50	-	14	14 (17.2 %)
51-60	-	2	2 (2.4%)
61-70	-	2	2 (2.4 %)
Total	2	79	81 (100 %)

Table 2: Comparison of clinical and cytological diagnosis (n=81)

Type of lesion	Clinical diagnosis (no. of cases)	Cytological diagnosis (no. of cases)
Carcinoma	26	25
Lump	2	-
Fibroadenoma	37	36
Fibrocystic diseases	7	6
Gynecomastia	2	2
Traumatic Fat Necrosis	1	-
Abscess/ Chr. Mastitis	6	4
Suspicious /Atypical	-	7
Scanty	-	1
Total	81	81

Out of the 81 cases of breast lumps, 26 (32%) were clinically diagnosed as carcinoma of the breast. Definite clinical diagnosis could not be made in 2 (2%) cases.

The above table gives the clinical and cytological correlation in the diagnosis of 81 cases of breast aspiration. Of the 26 cases with a clinical diagnosis of carcinoma, cytology revealed carcinoma or suspected carcinoma in 25 (31%) cases. 2 (2%) cases of lump, which diagnosed as benign clinically, one turned out to be suspicious/ atypical and other malignant on cytological examination. Out of 37 cases with clinical diagnosis of fibro adenoma, cytology revealed fibro adenoma in 36 (45%) cases only while in one case, the smear was too scanty to give any opinion.

Out of 6 cases (7%) diagnosed as chronic mastitis clinically, 4 smears were suggestive of mastitis while one was a definitely malignant smear and in the remaining one the smear was suspicious.

Out of 7 cases of clinically diagnosed fibrocystic diseases, 6 were cytologically diagnosed as fibrocystic diseases and in one, the smear was suspicious. 2 (2%) case of gynaecomastia diagnosed clinically was proved to be gynaecomastia on cytology and biopsy.

Suspicious smears were 7. Three cases that were clinically diagnosed as carcinoma or suspicious of carcinoma were reported cytologically as suspicious for atypical cells. One case each from clinically diagnosed fibrocystic diseases, chronic mastitis, traumatic fat necrosis and one case of vague lump

were reported cytologically as having a few suspicious atypical cells. The single scanty smear was from a case of fibroadenoma clinically.

Table 3 shows the cytological reports of smears according to the type of lesion. Cytology revealed malignant lesion in 25 (30.8%) cases while in

48 (59.2%) cases the cytology showed benign lesion. In 7 cases (8.6%) cases, the cytology showed suspicious features of malignancy. Scanty yield of material or insufficient for opinion was obtained in 1 (1.2%) case.

The largest group comprised of Fibroadenoma of which there were 36 (45%) cases.

Table 3: Analysis of various lesions on FNAC

Lesion	No. of cases	Percentage
Ductal carcinoma, NOS	23	28.3 %
Lobular carcinoma	2	2.5 %
Suspicious of malignancy	7	8.6 %
Fibroadenoma	36	44.4 %
Fibrocystic disease	6	7.4 %
Fibrocystic disease with granulomatous mastitis	2	2.5 %
Chronic mastitis	2	2.5 %
Gynecomastia	2	2.5 %
Inadequate material	1	1.2 %
Total	81	100 %

Analysis of various lesions on FNAC

Non- neoplastic lesions were 10/81(12%), the various lesions were fibrocystic disease 6/10(60%) and fibrocystic disease with granulomatous mastitis 2/10 (20%) and chronic mastitis 2/10 (20%).

Benign tumors constituted 38/81 (47%), the various

lesions were fibroadenoma 36/38 (95%), and gynaeomastia 2/38 (5%).

Malignant tumors observed on FNAC were 32/81 (40%) the various lesions were duct cell carcinoma 23/32 (72%), lobular carcinoma 2/32 (6%), and suspicious of malignancy 7/32 (22%). Material was not adequate in 1/81 (1%) cases.

Table 4: Correlation of cytology with routine histopathology

Lesions	Correlated	Not Correlated	Total
Duct cell carcinoma	21	2	23
Lobular carcinoma	2	-	2
Fibroadenoma	26	10	36
Gynaecomastia	2	-	2
Fibrocystic disease	5	1	6
Fibrocystic disease with granulomatous mastitis	2	-	2
Chronic mastitis	2	-	2
Suspicious of malignancy	7	-	4
Too very scanty material	0	1	1
Total	67	14	81

Overall diagnostic accuracy 93.8%
 Benign lesions diagnostic accuracy 73.7%
 Malignant lesions diagnostic accuracy 93.8%
 Non-neoplastic lesions diagnostic accuracy 90.0%

Discussion

Breast cancer is one of the most common cancers and is a leading cause of cancer related deaths in women. Breast cancer contributes for 25% of total cancer cases and 15% of all cancer deaths among females throughout the world. More developed countries account for almost 50% cases of breast cancer and 38% of deaths [3]. Incidence of breast cancer is

10.4% world- wide [4]. Among Indian women, cancer of the cervix and breast account for over 50% of cancer deaths [5]. Breast cancer is proportionately on the increase in a few metropolitan areas of India. This appears to be related to late marriage, birth of the first child at a late age, fewer children and shorter periods of breast feeding which are increasingly common among the educated urban women. Early diagnosis and management would help the patient to a great extent. In the hands of a trained and experienced pathologist, FNAC is an accurate diagnostic procedure, and its reliability and degree of accuracy in palpable breast lesions is well established.

The present study was done on 81 cases of breast lumps to determine the diagnostic accuracy of fine

needle aspiration cytology and its histopathological correlation.

Age Incidence

In the present study, the cases were distributed among the age groups from 12 to 70 years. The youngest patient was a 12 year old girl with fibroadenoma. Yalavarthi et al [6] too in their study observed the youngest patient as a 10 year old with a juvenile fibroadenoma.

Gender Incidence

Of the 81 cases studied, there were only 2 (2%) male cases, both with gynecomastia, and rest all 79 (98%) were females. In the series of Dandapat et al [7] there were 8 males of which two had carcinoma of breast and 6 had gynecomastia. Males constituted only 1% of breast lesions in the study by Deshpande et al [8]. Low incidence in males suggests that though males are rarely affected by breast disease, they are not totally exempt from mammary diseases.

Evaluation of Clinical Diagnosis

In each case, an attempt was made to diagnose the pathological nature of the lump clinically. A comparative study shows that out of 31 cases of histologically proven malignancy, the clinical diagnosis was consistent in 26 cases. The accuracy of clinical diagnosis for malignancy was 83.87% and was 70.8% for benign lesions. Thus the accuracy of clinical diagnosis for malignant cases was better than

that for benign lesions.

The overall diagnostic accuracy of clinical examination in the present study was 74.1%.

In a series of 480 cases, Smallwood et al [9] observed clinical diagnostic accuracy of 90% for malignant lesions and 86.7% for benign lesions. The overall accuracy in their series was 89.16%.

In the study by Dandapat et al [7] the overall accuracy of clinical examination was 91.3%. Furnival et al [10] also reported an accuracy of 85% in their study.

Thus the overall accuracy of clinical diagnosis of breast lesions in our study compares well with the observations of above authors.

Analysis of various lesions on FNAC

Benign tumors constituted 38/81 (46.9%), malignant tumors 32/81 (39.5%) and non-neoplastic lesions 10/81 (12.3%). Material was inadequate in 1 case 1/81 (1.2%).

In the present study cytological diagnosis was correlated with histopathological diagnosis, and the overall diagnostic accuracy was 93.8%, with accuracy rate of 74.0% in benign lesions, 94.0% in malignant lesions and 90.0% in non-neoplastic lesions.

The results of the present series were compared with the results of published series, and were found to be comparable except for benign lesions which constituted 32/81 (39.5%) of the total lesions of FNAC. The reason for this was the large number of deferred cases in our study.

Table 5: Comparison of accuracy of the present study with others

No.	Author	Year	Accuracy %		
			Non-neoplastic	Benign	Malignant
1	Zajdela et al ^[11]	1975	83.92%	89.49%	88%
2	Bansal et al ^[12]	1985	95.83%	100%	94.34%
3	Pandit et al ^[13]	1988	95.08%	89.74%	98.83%
4	Sreenivas et al ^[14]	1989	95.6%	96.7%	91.6%
5	Shyamala et al ^[15]	1990	93.6%	98.75%	96.77%
6	Present Series	2009	90.0%	73.7%	93.8%

Deferred Cases on FNAC were as Follows

There were total 13 deferred cases on FNAC. One case of duct cell carcinoma on FNAC was given a diagnosis of carcinosarcoma on routine HPE. In the above lesion, malignant ductal component was also present, which explains the pattern on FNAC.

One case of duct cell carcinoma on FNAC was given as fibrocystic disease on routine HPE, the amount of apocrine epithelium aspirated was in large sheets

with striking nuclear and cellular enlargement combined with degenerative changes, giving the false impression of duct cell carcinoma.

Four cases of fibroadenoma turned out to be duct cell carcinoma on routine HPE, due to less cell yield, in aspiration.

One case of fibroadenoma on cytology proved to be fibroadenosis on HPE. High cellularity with bare nuclei, lead to the diagnosis of fibroadenoma.

Three cases with high cellularity and with bare nuclei, lead to cytological diagnosis of fibroadenoma, later proved to be of fibrocystic disease on HPE, with fibro-adenomatoid hyperplasia.

Two cases of fibroadenoma on cytology, turned out to be tubular adenomas on HPE.

One case of fibrocystic disease turned out to be fibroadenoma with peripheral minimal fibrocystic changes on routine HPE.

In the present study, there was one false positive and four false negative cases. Sensitivity and specificity was 88.5% and 97.7% respectively. Positive predictive value and Negative predictive value of FNAC were 96.8% and 91.6% respectively.

In the study conducted by Hussain et al [16] false positive and false negatives were 0 and 9 cases respectively. The sensitivity and specificity was 90 % and 100% respectively.

In the study conducted by Yux et al [17] the sensitivity and specificity were 97.3% and 97.7% respectively.

Failed Aspiration in Literature as Compared to Present Study

In the study by Zajdela et al [11] Bansal et al [12] and Pandit et al [13] the aspiration failure rate was observed as 0.3%, 1% and 1.13%. Our study had a failed aspiration of 1% which compares well with the studies of above authors. Sreenivas et al [14] reported a slightly higher failed aspiration rate of 7.65%. In the present study, material was not adequate for interpretation in one case, which was diagnosed as fibroadenoma with hyalinization on routine histopathology. This case failed to yield any material on FNAC, due to extensive hyalinization.

Scanty Yield of Material

The cellular yield at aspiration depends upon the nature of the lesion. The smears of majority of cases from carcinoma are rich in cells. Fibroadenoma cases show moderate degree of cellularity and in fibrocystic disease, the material is usually scanty. Besides the nature of lesion, other factors which control cellular yield are the size of the tumor and type of stromal reaction. Presence of dense sclerosed stroma in mammary dysplasia interferes with the loosening and separation of cells during negative suction at aspiration with resultant scanty yield. Stromal hyalinization again leads to poor yield at aspiration as was seen in one of our cases.

Zajdela et al [11] attributed the following factors as responsible for the failure to recognize or obtain malignant cells in the smear

1. Size of the lesion: It is more difficult to sample smaller lesions. The rate of false negative diagnosis of T₁ tumor was 6% whereas in T₂ and T₃ tumors it was only 3% in their study.
2. Lack of well-defined cytological abnormalities of malignancy in some carcinomas.
3. Substantialedema as in the inflammatory type of carcinoma may interfere with the aspiration of malignant cells.
4. Malignant lesions in the vicinity of a benign cyst which could be the only lesion sampled.

Complications

As regards the postulated complications of fine needle aspiration cytology, like the spread of tumor along the needle tract, hematoma and infection, no such complications were noticed in the present study. Local oozing of blood was noticed in majority of the cases with carcinoma of breast, but this was controlled easily by firm pressure with dry cotton gauge piece. Reported complications of the procedure are also minimal especially when fine 22 to 23 gauge needles are used as was done in the present study.

Kline et al [18] analyzed 2612 biopsies of breast in their study and reported no incidence of local or metastatic spread.

As regards the vascular and lymphatic dissemination of tumor cells following aspiration biopsy, again no evidence of increased risk of these complications have been observed clinically or in experimental studies as observed by Engzell et al [19].

Dandapat et al [7] also did not observe any complications like implantation in the needle tract, infection, hematoma or lowering of long term survival.

It can be inferred from the above observation that fine needle aspiration cytology is not associated with any significant complications.

In the present series, no immediate complications of FNAC were observed.

Aspiration cytology was found to be very useful in our experience in the diagnosis of different breast diseases. The factors, which influenced the accuracy of diagnosis, were:

1. Adequate clinical information of the case.
2. Observation made at the time of aspiration regarding the nature and quantity of the material

aspirated.

3. Experience of the cytologist in reporting of the smears.

Adequate clinical information and observations made at the time of aspiration influence the final assessment of the smears. Optimal results can be achieved if the cytologist reading the smears performs the aspirate. Moreover, the decision whether aspiration cytology needs to be repeated or extra smears for special stains are required, can be taken right at the time of aspiration, thus avoiding the unnecessary delay in giving the report or a repeat visit of the patient. In the present study, same principles were followed in performing the aspirations.

Yu et al [20] in their review and meta-analysis of 46 studies concluded that most of the benign and malignant lesions of breast can be reliably diagnosed by using FNAB method. Non-palpable breast lesions can be sampled easily by carrying out FNAB under guidance of imaging. For inadequate samples they recommended further invasive procedures. They emphasized the usefulness of FNAB technique for diagnosing breast lesions especially in developing countries.

Conclusion

Clinical examination alone is not a reliable criterion for diagnosing and deciding upon the line of treatment for breast lumps. FNAC as an OPD procedure, is easy to perform, takes less time gives quicker results with reasonably good diagnostic accuracy. FNAC provides an early pre-operative diagnosis, thus allaying the patient's anxiety. FNAC procedure has no significant complications excepting chances of bleeding or hematoma formation, that too very rarely. It can be used for diagnosis in non-neoplastic and benign proliferative conditions. A trucut biopsy is recommended whenever a malignancy is suspected clinically or in cases of aspiration failure.

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