

Accuracy of fine needle aspiration cytology in categorization of breast lumps

Pradeep S. Jadhav^{1,*}, Megha Pandey², Ashish Pandey³¹Associate Professor, ^{2,3}Assistant Professor, Dept. of Pathology, American International Institute of Medical Sciences, Udaipur, Rajasthan, India***Corresponding Author:**

Email: psjadhav9656@gmail.com

Abstract

Diagnostic breast lump FNAC is an important part of triple assessment. At a tertiary hospital retrospective study was done. The study compared malignant lesions diagnosed on fnac with its histopathological diagnosis. 125 cases were selected for the study of which 29 cases found to be positive for malignancy. Two cases found to be false negative. The sensitivity of FNAC for detection of malignancy was 92.59% while specificity 100%. The conclusion is that FNAC can be a very important diagnostic test in detecting malignancy in palpable breast lumps. The research show the final histopathology diagnosis highly correlating with the cytological diagnosis.

Keyword: Cytology, Fnac.**Introduction**

As general population becoming more aware about breast lump, people are coming in large number to the clinicians. Any breast lump can be malignant that is why the patients and clinicians are worried. Although histopathology is the most reliable and important diagnostic test for breast lumps, the tests gaining importance are FNAC and Core needle biopsy.⁽¹⁾

Fine needle aspiration is a rapid, simple, reliable, complication free and cheaper test in diagnosing breast lumps. Surgery can be planned according to fnac report. The second most common malignancy in Indian women is of breast.⁽²⁾ Local anaesthesia is also not required for this procedure. In 1930 Martin and Lewis first brought this procedure into practice at Memorial Hospital USA.⁽³⁾

In the hands of trained and experienced pathologists, the accuracy of FNAC can be equal to that of histopathology.⁽⁴⁾ USG or CT guided FNAC or multiple passes in the breast lumps can increase the accuracy of fnac.⁽⁵⁾ Most of the breast diseases present with breast lumps. The clinicians mostly follow "triple assessment" protocol. It includes first clinical diagnosis, then mammography and FNAC.

FNAC is very important part of triple assessment. The procedure is expected to be very effective which

will avoid further diagnostic biopsy before final definitive surgery.

Materials and Methods

This study was done in the department of Pathology of American International Institute of Medical Sciences, Udaipur between Jan 2016 to July 2017. This is a retrospective study of palpable breast lumps. Slides were collected from histopathology and FNAC records in the respective sections of the department. Request form were used to note down age, sex, and clinical presentation of the patients. Slides of all FNAC and histopathology were reviewed in order to confirm the diagnosis. Findings of FNAC were correlated with histopathology diagnosis. Sensitivity, specificity, accuracy, positive predictive value and negative predictive value were calculated using standard statistical methods. In our cytology section, FNAC for breast lumps is done using 23 gauge needle and 10cc syringe.

Results

There were 125 cases of FNAC obtained in one and half years period which formed 11% of all FNAC in the department of Pathology. Out of these 125 cases 5 patients were males and rest 120 cases were females. The patients were between the age of 13-79 yrs.

Table 1: Distribution of cases according to age

Age group (yrs.)	Benign and inflammatory		Malignant	
	No. of cases	%	No. of cases	%
0-10	-	0%	-	0%
11-20	8	8.50%	-	0%
21-30	49	52.15%	1	3.26%
31-40	29	30.85%	2	6.45%
41-50	7	7.44%	10	32.25%
51-60	1	1.06%	13	41.93%
61-70	-	0%	3	9.67%
71-80	-	0%	2	6.45%
Total	94	100%	31	100%

Table 1 shows distribution of cases according to age. It shows that benign and inflammatory lesions were common in the young age group (21-30yrs) with 49 cases (52.15%) whereas malignant cases were

common in older adults age group (51-60yrs) with 13 cases (41.93%). Thus benign lesions were common till 4th decade while malignant lesions were common in the 5th, 6th and 7th decade.

Table 2: Distribution of cases according to sex incidence

Age group (yrs.)	Females	%	Males	%
0-10	-	0%	-	0%
11-20	5	4.16%	3	60%
21-30	50	41.66%	-	0%
31-40	31	25.83%	-	0%
41-50	16	13.33%	1	20%
51-60	13	10.83%	1	20%
61-70	3	2.53%	-	0%
71-80	2	1.66%	-	0%
Total	120	100%	5	100%

Table 2 shows distribution of cases according to sex incidence. It shows that majority of breast lumps were common in females than males. In females they were common during 21-30 yrs of age group (41.66%) whereas in males they were common during 11-20 yrs. of age group (60%).

Table 3: Distribution of cases according to reproductive age (hormonal status)

Type of lesion	Reproductive age (15-35 yrs.)		Premenopausal (36-43 yrs.)		Postmenopausal (>43 yrs.)	
	No. of cases	%	No. of cases	%	No of cases	%
Benign & infl.	76	98.70%	11	84.61%	4	12.50%
Malignant	1	1.30%	2	15.39%	28	87.50%
Total	77	100%	13	100%	32	100%

Table 3 shows that benign & inflammatory lesions were common in reproductive age group (98.70%) whereas malignant lesions were common in postmenopausal age group (87.50%).

Table 4: Distribution of cases according to anatomical location of the breast lumps

Total cases	Upper outer quadrant		Upper inner quadrant		Lower outer quadrant		Lower inner quadrant		Central quadrant	
	No. of cases	%	No. of cases	%	No. of cases	%	No. of cases	%	No. of Cases	%
125	75	60%	6	4.80%	13	10.40%	5	4%	26	20.80%

Table 4 shows that the common anatomical location for the breast lumps was upper outer quadrant 75 cases (60%) followed by central quadrant 26 cases (20.80%).

Table 5: Distribution of various breast lesions according to cytological typing

Name of lesions	No. of cases	percentage	Total cases
A. Inflammatory lesions			10
i. Breast abscess	4	3.2%	
ii. Acute mastitis	5	4%	
iii. Chronic granulomatous mastitis	1	0.8%	23
B. Benign disease of the breast (benign neoplastic)	23	18.4%	
C. Benign lesions			
i. Fibroadenoma	38	30.4%	60
ii. Fibrocystic disease	16	12.8%	
iii. Gynaecomastia	5	4%	
iv. Galactocele	1	0.8%	4
D. Suggestive of malignancy	4	3.2%	
E. Positive for malignancy	25	20%	25
F. Inadequate	3	2.4%	3
Total cases	125	100%	125

Table 5 shows distribution of various breast lesions. Most common lesion was Fibroadenoma

(30.40%) followed by breast carcinoma (20%). The benign diseases which could not be included in specific category were categorized into benign disease of the breast. They were seen in 18.4% of cases. Fibrocystic disease was seen in 12.80% of cases. One case of chronic granulomatous mastitis was seen. The smear on ZN staining was positive for acid fast bacilli. so the diagnosis of tuberculous mastitis was

made. Five cases of gynaecomastia were seen (4%). There were three inadequate smears. In our setup inadequate samples were repeated twice and there was improvement in success with two consecutive approaches. Some cases because of low material on FNAC but smears showing suspicious malignant cells were included in the category suggestive of malignancy. They were seen in 3.2% of cases.

There were 20% cases which were positive for malignancy.

Table 6: Comparison of aspiration cytology with histopathology

Cytology diagnosis	Total no. of cases on cytology	No. of cases resected	No. of cases on histopathology			
			Consistent	%	Inconsistent	%
i. Positive for malignancy	25	25	25		0	
ii. Suggestive of malignancy	4	4	4		0	
iii. Benign lesion	60	29	28		1	
iv. Benign disease of the breast	23	14	13		1	
v. Inflammatory	10	0	--		--	
vi. Inadequate	3	3	0		3	
Total	125	75	70	93.33%		6.66%

Table 6 shows comparison of aspiration cytology with histopathology.

Out of 125 cases, histopathology was available in 75 cases. All 25 cases positive for malignancy on cytology proved to be malignant on histopathology. All 4 cases suggestive of malignancy on cytology proved to be malignant on histopathology. so there were no false positive cases.

The sensitivity and specificity for malignancy in this study were calculated by using standard statistical formulae. They were 92.59% and 100% respectively. The formula for sensitivity of FNAC for malignancy in this study was $\text{Sensitivity} = \frac{\text{true positive}}{\text{true positive} + \text{false negative}}$. The sensitivity calculated was 92.59%. The specificity for malignancy was calculated using the formulae $\text{Specificity} = \frac{\text{true negative}}{\text{true negative} + \text{false positive}}$. The specificity calculated was 100%. The positive predictive value of a test is the probability that the patient with a positive test has the disease in question. The positive predictive value for malignancy was calculated using the formula $\frac{\text{True positive} \times 100}{\text{True positive} + \text{false positive}} = \frac{29 \times 100}{29 + 0} = 100\%$. The negative predictive value of a test is the probability of a patient with a negative test not having the disease in question. The negative predictive value for malignancy was calculated using the formula $= \frac{\text{True Negative} \times 100}{\text{true negative} + \text{false negative}} = \frac{41 \times 100}{41 + 2} = 95.34\%$.

There were two false negative cases. In the first case aspirate was scanty and on few cells benign diagnosis was given but malignancy was missed. This was a procedural error. In the second case few cells with large hyperchromatic, pleomorphic nuclei and scanty cytoplasm were seen on a background of

cellular cohesive benign ductal epithelial cells. This was interpretational error.

Discussion

Patients having breast lump are common in surgical OPDs of major hospitals. The main anxiety is possibility of malignancy. Therefore early diagnosis is essential.

FNAC is best suited in the diagnosis of breast lumps because it is cheaper, the reporting is quick and anaesthesia is not required with no requirement of hospital stay. If performed by trained pathologist and image guided fnac wherever required accuracy of FNAC can be increased. FNAC has achieved vast popularity in diagnosing malignancies in last thirty years. It can diagnose presence of cancer before surgery. It is also useful in the treatment of other breast lesions.

The important aim of our study was diagnostic correlation between fine needle aspiration cytology and the histopathology of the lump. We wanted to know the accuracy and reliability of fnac in diagnosing breast pathology and how it helps us in proceeding towards definitive excisional surgery.

The observations of this study correlated well with the study by Hussain et al.⁽⁶⁾ Homesh et al.⁽⁷⁾ Tiwari⁽⁸⁾ and Ariga et al.⁽⁹⁾ regarding age wise distribution and location of the malignant tumors. The most common pathology found in our study was fibroadenoma in 38 patients (30.4%). Tiwari et al.⁽⁸⁾ also reported fibroadenoma as the most common pathology (39.6%) in his study of 91 patients. It is evident from this study that benign breast lumps are

most common in breast pathology. The study also brings to the notice increased awareness in patients. FNAC can also be helpful in the diagnosis of recurrence of breast carcinoma.

Some lesions like atypical epithelial hyperplasia, regenerating epithelial atypia can give rise to false positive results.⁽¹⁶⁾ False positive cases were not found in our study.

In our study positive predictive value and sensitivity of FNAC were calculated as 100% and 92.59% respectively, while negative predictive value and specificity for malignancy were 95.34% and 100% respectively. The accuracy was 93.33%.

Table 7: Sensitivity and Specificity of FNAC by different studies

Studies	Sensitivity %	Specificity %
Watson DP ⁽¹¹⁾	74	99
Tiwari M ⁽⁸⁾	83.3	100
Sreenivas M ⁽¹²⁾	91	91
A Singh ⁽¹³⁾	84.6	100
Horgan PG et al. ⁽¹⁵⁾	84	99
Bojia F et al. ⁽¹⁰⁾	94.3	78.6
Hussain ⁽⁶⁾	90.9	100
Jayaram ⁽¹⁴⁾	97.4	92.4
Present study	92.6	100

The present study and other studies are compared well in diagnosing breast lumps.⁽⁸⁻¹⁴⁾ (Table 7).

The performance of a test is measured by its “predictive value” which is the diagnostic power of the test. Positive predictive value and negative predictive value are important in this regard. Positive predictive value of 100% and a negative predictive value of 92% was reported by Franco et al⁽¹⁷⁾ in his study of 300 patients regarding utility of fnac. Choi et al,⁽¹⁸⁾ on correlation of FNAC and histopathology, studied 1297 patients and found the positive predictive value 98.4% and a negative predictive value of 88%.

Conclusions

Fine-needle aspiration cytology is simple, cheaper, well tolerated by patients, repeatable, easy and reliable diagnostic test. The diagnostic accuracy of FNAC is very high when performed by trained and experienced pathologist. FNAC in the breast lumps has high sensitivity and a high positive predictive value. This proves that a positive FNAC in the breast means a definite diagnosis of the concerned pathology. This has been proved if compared with the final histology report. High accuracy of FNAC in the diagnosis of malignancy in the breast is shown by its high specificity and high negative predictive value. Thus, the high degree of correlation between FNAC and histopathology shows that fnac is very important preliminary diagnostic test in diagnosis of palpable breast lumps.

References

1. Sandhu DS, Sandhu S, Karsawara RK, Marwah S; Profile of breast cancer patients at a tertiary care hospital in North India. *Indian J Cancer*, 2010;47(1):16-22.
2. Ariga R, Bloom K, Reddy VB, Kluskens L, Francescatti D, Dowlat K et al.; fine needle aspiration of clinically

3. suspicious palpable breast masses with histopathological correlation. *Am J Surg.*, 2002;184(5):410-413.
4. Martin HE, Ellis EB; Biopsy by needle puncture and aspiration. *Ann Surg.*, 1930;92(2):169-181.
5. Frable WJ; Thin needle aspiration biopsy. In Bennington JL editor; Major problems in pathology. Volume 14, WB Saunders, Philadelphia;1983.
6. PhilipsG, McGuireL, Clowes D; The value of ultrasound-guided fine needle aspiration in the assessment of solid breast lumps. *Australas Radiol.*,1994;38(3):187-192.
7. Hussain MT. Comparison of fine needle aspiration cytology with excision biopsy of breast lump. *J Coll Physicians Surg Pak* 2005;15(4):211-214.(s).
8. Homesh NA, Issa MA, El-Sofiani HA. The diagnostic accuracy of fine needle aspiration cytology versus core needle biopsy for palpable breast lump(s) Dept of General Surgery, Sana'a University Sana'a, Yemen. *Saudi Med J*2005;26(1):42-6.
9. Tiwari N. *Katmandu University Medical Journal* 2007;5(2)18:215-217.
10. Ariga R, Bloom K, Reddy VB, Kluskens L, Francescotti D, Dowlat K, Siziopikou P, Gattuso P. Fine-needle aspiration of clinically suspicious palpable breast masses with histopathological correlation. *M J Surg* 2002;184:410-3.
11. Bojia F, Demisse M, Dejana A, Bizuneh T; Comparison of fine needle aspiration cytology and excisional biopsy of breast lesion. *East Afr Med J.*,2001;78(5):226-228.
12. Watson DP, Mc Guire M, Nicholson F Given HF; Aspiration cytology and its relevance in diagnosis of solid breast tumors. *Surg Gynecol Obstret.*,1987;165(5):435-41.
13. Sreenivas M, Kumar GH Reddy SJ, Bhaskaran CS; Role of fine needle aspiration cytology in the diagnosis of breast lumps and its histopathological correlation. *Indian J pathol Microbiol.*, 1989;32(2):133-137.
14. Singh A, Haritwal A, Murali BM; Pattern of breast lumps and diagnostic accuracy of fine needle aspiration cytology; a hospital based study from Pondicherry, India. *The internet Journal of Pathology*. 2011;11(2). Available from <https://ispub.com/IJPA/11/2/7568>

15. JayaramG, Alhady SF, Yip CH; Cytological analysis of breast lesions a review of 780 cases. *Malays J Pathol.* 1996;18(2):81-87.
16. Horgan PG, Waldron D, Mooney E, O'Brien D, McGuire M, Given HF; The role of aspiration cytology examination in the diagnosis of carcinoma of the breast. *Surg Gynecol Obstet.*,1991;172(4):290-292.
17. A Khemka, N Chakrabarti, S Shah, V Patel. Palpable Breast Lumps: Fine-Needle Aspiration Cytology versus Histopathology: a Correlation of Diagnostic Accuracy. *The Internet Journal of Surgery.* 2008 Volume 18 Number 1.
18. Medina Franco H, Abara Perez L. Fine needle aspiration biopsy - institutional experience. *Zubiran* 2005;57:394-8.(s).
19. Choi YD, Choi YH, Lee JH, Nam JH, Juhng SW, Choi C. *Acta Cytol.* 2004;48:801-6.