Role of FNAC in Breast Lump and its Histopathological Correlation

Shrestha R[1], Baidya P[1], Adhikari M[1], Bharti SV[2], Shrestha A[3]

ABSTRACT

Introduction: Breast malignancy is one of the common causes of morbidity and mortality among females. Screening of breast lumps by Fine Needle Aspiration Cytology (FNAC) is included in triple approach and is easy to perform. Accuracy of diagnosis can be further enhanced by histopathological confirmation. **Aims:** The role of FNAC in diagnosis of breast lumps and to determine its diagnostic accuracy. **Methods:** This was a hospital based prospective study conducted over the period of one year (from March 2023 to February 2024) in department of Pathology, Nepalgunj Medical College, Kohalpur, Nepal. Patients who presented with breast lump underwent FNAC with biopsy for histopathological study was included in the study. Cytological opinion was categorized according to International Academy of Cytology Yokohama System for Reporting Breast Fine Needle Aspiration Biopsy Cytopathology criteria reporting system. Histological correlation was carried out in patients who went surgical excision or biopsy of the lesion. **Results**: Most common diagnosis on cytology was fibroadenoma. According to International Academy of Cytology Yokohama reporting system C2 (benign) was most common reported category (19 cases). On histopathological study, 19 cases were benign and 13 cases were malignant with most common benign lesion being fibroadenoma and all malignant cases were Invasive ductal carcinoma. All cases diagnosed as malignant on cytology were concordant on histopathology. Three benign, one atypical and one suspicious on cytology were malignant on histopathological study. The sensitivity and specificity of FNAC was 84.2% and 69.2% respectively. Diagnostic accuracy of FNAC was 59.4%. **Conclusion**: Breast FNAC is a rapid and reliable tool for evaluation and have high sensitivity and specificity.

Keywords: Breast, Cytology, FNAC, Histopathology

Authors:

1. Dr. Richa Shrestha
2. Dr. Pooja Baidya
3. Dr. Milan Adhikari
4. Dr. Shiv Vansh Bharti
5. Dr. Anil Shrestha

[1]Department of Pathology, Nepalgunj Medical College and Teaching Hospital, Banke, Nepal

[2]Department of General Surgery, Nepalgunj Medical College and Teaching Hospital, Banke, Nepal

[3]Department of Medicine, Nepalgunj Medical College and Teaching Hospital, Banke, Nepal

Address for Correspondence:

Dr. Richa Shrestha
Assistant Professor
Department of Pathology
Nepalgunj Medical College and Teaching Hospital
Kohlapur, Banke, Nepal
Email: shresthericha@hotmail.com

INTRODUCTION

Breast lesions commonly present clinically as palpable lumps, nipple discharge or pain. Fine Needle Aspiration Cytology (FNAC) is one of the safe, easiest and widely used method for identification of various types of lesions. It is also an important component of triple approach for breast mass. FNAC is highly sensitive, specific and rapid diagnostic tool.[1] It has an important role in evaluation of breast masses before surgical procedure and helps in differentiation of benign from malignant lesion for appropriate management. Breast cancer account for 11.7 % of cancer in both sexes and 6.9 % death globally.[2] In Nepal, breast cancer is fourth common cancer in both sexes accounting for 9.6% of cases and third most common cancer in females accounting for 17.1%.[3] This study was conducted to evaluate the role of FNAC in identifying the spectrum of breast lesion and the cytological findings was compared with histopathological findings of breast biopsy.

METHODS

This is a hospital based prospective study conducted over the period of one year (March 2023 to February 2024) in department of Pathology, NGMC, Kohalpur, Nepal. Informed verbal consent from the patient was also obtained. Patients who presented clinically with breast lump was included in the study in which both FNAC and histopathological study were conducted. Relevant clinical data were obtained from records or from patient's history.

FNAC was performed using 22G needle fitted on 10ml disposable syringe. Smears were prepared from aspirated sample and stained with Giemsa and Pap stain after proper fixation.[4] A cytological opinion was made by correlating with clinical and radiological findings. Histological correlation was carried out in patients who went surgical excision or biopsy of lesion. Lesions on FNAC were categorized as C1-C5 as per The International Academy of Cytology (IAC) Yokohama System for Reporting Breast Fine Needle Aspiration Biopsy Cytopathology criteria. Inadequate/ insufficient (C1): aspirates having hypocellular or poorly fixed smears. Benign (C2): aspirates having unequivocally benign cytological features, which may or may not be diagnostic of a specific benign lesion. Atypical (C3): aspirates having predominant benign feature but with some additional features that can be seen in malignant lesion. Suspicious of malignancy (C4): aspirates with presence of some cytological features which are usually found in malignant lesions but with insufficient malignant features, either in number or quality, to make definitive diagnosis of malignancy. Malignant (C5): aspirates with unequivocal malignant features and type of malignancy identified is stated whenever possible. The risk of malignancy (ROM) for each category is 2.6-4.8%, 1.4-2.3%, 13-15.7%, 84.6-97.1% and 99.0-100% respectively.[5] For statistical analysis FNAC results were further subdivided as benign and atypical proliferative lesions / suspicious of carcinoma/ malignant category. Similarly, the biopsy results were also subcategorized as benign and atypical / malignant.

Inclusion Criteria

Patients with palpable or non-palpable breast lumps that underwent FNAC and later surgical exploration either in the form of lumpectomy or mastectomy.

Exclusion Criteria

All the cases who have not undergone surgery were excluded.

Data was analyzed using Microsoft excel and standard statistical software SPSS 20.0. Cyto-histopathological correlation was done. Sensitivity, specificity, Positive predictive value, Negative predictive value and diagnostic accuracy of FNAC were calculated.

RESULTS

A total of 32 cases were included in the study which have undergone both FNAC and histopathology study. The age of patients ranged from 16-80 years and most common age range being 31-40 years and 41-50 years with nine cases in each group. All patients included were female. Left breast was seen to be more commonly involved than right side, which included 17 cases (53.1%) presented as left breast lump/lumpiness. The upper and outer quadrant of breast was the commonest part involved. Painless breast lump was most common presenting feature which included 24 cases. Breast lump with pain was present in five cases. Skin changes related to malignancy was seen in two cases. Nipple discharge was present in four cases.

In this study, cytological diagnosis was categorized according to IAC Yokohama system, cases were reported as benign which included lesions like fibroadenoma, abscess, fibrocystic change and benign proliferative changes. Among these, commonest lesion was fibroadenoma (11 cases), including two cases of complex fibroadenoma and three cases of cellular fibroadenoma. Two cases of atypical lesion were reported which included fibroadenoma with atypia and borderline phylloides (one case each). Three cases were suspicious of malignancy on cytology. Malignancy was reported in eight cases all showed cytological features compatible with infiltrative ductal carcinoma (IDC). (Table I)

Cytology			Histology (N)
Category	**FNAC**	**N**	
C1 (Inadequate/ insufficient)	Inadequate	0	0
C2 (Benign)	Fibroadenoma	6 (18.8%)	Fibroadenoma-4 Benign Phylloides-1 DCIS-1
	Fibrocystic change	3 (9.4%)	Fibroadenoma-2 Papillary neoplasm suspicious of invasion-1
	Abscess	3 (9.4%)	Chronic mastitis-2 Duct ectasia-1
	Cellular Fibroadenoma	3 (9.4%)	Fibroadenoma-2 Fibroadenoma with UDH-1
	Complex Fibroadenoma	2 (6.2%)	Fibroadenoma with secondary changes-1 Fibroadenoma-1
	Lactational adenoma	1 (3.1%)	Lactational adenoma-1
	Cellular Papillary lesion	1 (3.1%)	Fibrocystic change with apocrine atypia-1
C3 (Atypical)	Complex fibroadenoma with atypia	1 (3.1%)	Fibroadenoma with secondary changes-1
	Borderlline Phylloides	1 (3.1%)	Malignant phylloides-1
C4 (Suspicious of malignancy)	Suspicious of malignancy with fibrocystic change	3 (9.4%)	Fibrous mastopathy-1
	Suspicious of malignancy with abscess		Duct ectasia-1
	Suspicious of malignancy		Intraductal carcinoma-1
C5 (Malignant)	Intraductal Carcinoma	8 (25.0%)	Intraductal carcinoma, NST-6 Intraductal carcinoma with medullary features-2

Table I: Cyto-histological correlation according to category

On histological examination, 19 cases were benign (59.4%) and 13 cases were malignant (40.6%). Most common benign lesion was fibroadenoma, 13 cases (40.6%). Two cases reported as fibrocystic change in cytology were reported as fibroadenoma

in histopathology. One case reported as fibroadenoma on cytology showed morphology of benign phylloides on histopathology and one case was diagnosed as DCIS. One case of fibrocystic change on cytology was reported as papillary neoplasm with areas suspicious of invasion on histology. Cases of fibroadenoma also showed areas of secondary changes and UDH on histology (2 and 1 case respectively). One case of borderline phylloides on cytology was reported as malignant phylloides on histopathology. Among three cases which was reported as suspicious of malignancy on cytology, two were benign and one was of IDC. All cases reported as malignant on cytology were concordant on histology. Six cases were of IDC with no special type (NST) and two cases were of IDC with medullary features. Out of eight cases of IDC, three were of grade I and four cases were of grade II. (Table I, Table II)

		Histology		Total	P-Value
		Benign	Malignant		
Cytology	Benign	16	3	19	<0.001
	Atypical	1	1	2	
	Suspicious	2	1	3	
	Malignant	0	8	8	
Total		**19**	**13**	**32**	

Table II: Cyto-histological cross tabulation

Statistical analysis showed sensitivity of 84.2%, specificity of 69.2% of FNAC. Positive Predictive Value was 80.2%, Negative Predictive Value was 75.0% and diagnostic accuracy if FNAC was 59.4%. Correlation was done by categorizing the lesion as benign and malignant and was statically significant with P value of <0.01. (Table II)

DISCUSSION

Evaluation of breast lesion/lumps by FNAC is useful for preoperative diagnosis and management in both benign and malignant cases.[6,7] With rapid increase in the incidence of breast malignancy among female population, role of FNAC with other tests is vital. FNAC is cheap, easy to perform, accurate and less invasive than biopsy and can be used in follow-up of required cases as well.[8] IAC Yokohama system helps to categorize breast lesion and based on associated ROM management can be planned accordingly.[5]

Most of the cases were seen in age group of 31-40 years and 41-50 years which is also seen in other studied done by Malini AG, Hussain MT, Ariga R et al, Shrestha A and Tripathi K.[1,9,10,11,12] Some studies showed more number of malignant breast neoplasm in age more than 50 years which could be due to late medical attention because of lack of knowledge regarding the illness or fear of cancer treatment and outcome or lack of breast self-examination awareness.[13,14] On cytology, 16 cases were benign with most common diagnosis being fibroadenoma (11 cases) which is also seen in other studies.[1,6,13,15] In this study, left breast was most commonly involved than right with outer upper quadrant being common site.[1,9,16,17] On FNAC maximum number of cases were in C2 category followed by C5 which is also seen in other studies.[6,17] All cytologically diagnosed cases of malignancy were proven to be malignant on histopathology, also with similar type (IDC), similar to studies done by Khan A, Ahuja S, Mahajan NA, Malukani K and Tiwari M.[13,15,18,19,20] Thus showing FNAC as reliable method for helping diagnosing malignant breast lumps.

Missing the lesions while aspiration is the most common cause of false negative diagnosis on FNAC and false positive results can be seen in fibroadenomas with proliferative changes which may appear atypical.[6,7,21] In this study, three cases had suspicious result on cytology which on biopsy showed benign lesion in two cases and one was malignant. Four cases which was reported under benign and atypical category were malignant on histology. This can happen if FNAC aspirate was obtained without proper image guidance in small lesions or lesions with variable areas showing benign changes as well.[15,22]

In this study, results for statistical analysis of sensitivity, specificity and diagnostic accuracy of FNAC was close to other studies done by Tripathi K and Shila KM et al, the sensitivity was found to be in the range of 65-97.5% and specificity in range of 72.4%-100% in different studies which is close of this study with sensitivity of 84.2% and specificity of 69.2%.[12,23] Most of the studies had diagnostic accuracy of FNAC higher than this study, relatively low diagnostic accuracy of FNAC could be due to small sample size, misdiagnosis of lesion in cytology as atypical/suspicious due to low cellularity and proliferative changes resembling atypia which caused decline in specificity.[1,15]

LIMITATIONS

One of the limitations of this study is that the cases with both cytological and histological study were less, thus data might be less for accurately categorizing the statistical analysis of the study. Other limitation related to FNAC is difficulty in categorizing lesions with hypocellular smear or suspicious diagnosis due to low grade atypia which can give false negative or false positive impression on cytology.

CONCLUSION

FNAC as effective diagnostic method and can be used with histopathological study for providing concordant diagnosis in breast lesion with high sensitivity and specificity. Categorizing cytological diagnosis according to standard reporting system helps to simplify the result understanding and following the management required.

REFERENCES

1. Malini AG, Singh MN, Aisabi KA. Spectrum of breast lesions and cyto- histopathological correlation - A retrospective study in a teaching institution in North Malabar. Indian Journal of Pathology and Oncology. 2018;5(2):254-61.
2. Population Fact sheet, Global Cancer Observatory, GLOBOCAN 2020. March 2021. [https://gco.iarc.fr/today/home].
3. Breast Cancer Fact Sheet Nepal World Health Organization (WHO). 21 March 2021. [GLOBOCAN 2020 Nepal, Breast cancer (who.int)].

4. Orell SR, Sterrett GF. Orell and Sterrett's Fine needle aspiration cytology. 5th ed: Elsevier 2012; 8-15.

5. Field AS, Raymond WA, Rickard M, Arnold L, Brachtel EF, Chaiwun B. The international academy of cytology Yokohama system for reporting breast fine-needle aspiration biopsy cytopathology. Acta Cytol. 2019;63(4):257-73.

6. Daramola AO, Odubanjo MO, Obiajulu FJ, Ikeri NZ, Banjo1 AA. Correlation between Fine-Needle Aspiration Cytology and Histology for Palpable Breast Masses in a Nigerian Tertiary Health Institution. Int J Breast Cancer. 2015;2015:742573. doi: 10.1155/2015/742573.

7. Ellis IO, Humphreys S, Michell M, Pinder SE, Wells CA, Zakhour HD. Guidelines for breast needle core biopsy handling and reporting in breast screening assessment. J Clin Pathol. 2004; 57(9): 897–902.

8. Garbar C, Cure H. Fine-needle aspiration cytology can play a role in neoadjuvant chemotherapy in operable breast cancer. ISRN Oncol. 2013;2013:935796. doi: 10.1155/2013/935796.

9. Hussain MT. Comparison of Fine needle aspiration Cytology with excision biopsy of breast lump. J Coll Physicians Surg Pak. 2005;15(4):211-21.

10. Ariga R, Bloom KI, Reddy VB, Kluskens L, Francescatti D, Dowlat K, Siziopikou P, Gattuso P. Fine needle aspiration of clinically suspicious palpable breast mass es with histopathological correlation. Am J Surg. 2002;184 (5):410-3.

11. Shreshta A, Chalise S, Karki S and Shakya G. Fine needle aspiration cytology in a palpable breast lesion. Journal of Pathology of Nepal. 2011;1:131-35.

12. Tripathi K, Yadav R, Maurya SK. A Comparative Study Between Fine-Needle Aspiration Cytology and Core Needle Biopsy in Diagnosing Clinically Palpable Breast Lumps. Cureus. 2022 Aug 5;14(8):e27709. doi: 10.7759/cureus.27709.

13. Khan A, Jamali R, Jan M, Tasneem M. Correlation of Fine Needle Aspiration Cytology and Histopathology Diagnosis in the Evaluation of Breast Lumps. Int J Med Students. 2014; 2(2): 40-3.

14. Ogbuanya AU, C Anyanwu SN, Nwigwe GC, Iyare FE. Dianostic accuracy of fine needle aspiration cytology for palpable breast lumps in a Nigerian teaching hospital. Niger J Clin Pract. 2021; 24: 69-74.

15. Ahuja S, Malviya A. Categorization of Breast Fine Needle Aspirates Using the International Academy of Cytology Yokohama System Along with Assessment of Risk of Malignancy and Diagnostic Accuracy in a Tertiary Care Centre. J Cytol. 2021; 38(3): 158–163.

16. Deshpande KA, Bharambe BM, Ajmera AP. Diagnostic utility of aspiration biopsy of the breast lesions. Cibitech Journal of Bio- Protocols. 2012;1(2):14-21.

17. Agarwal R, Nitesh M, Jagdamba.S, Garima.G, Parbodh.K. Spectrum of breast diseases with cyto–histopathological correlation in a tertiary care hospital of Western Uttar Pradesh. IJPO. 2017;4(1):1-7.

18. Mahajan NA, Bhale CP, Mulay SS. Fine needle aspiration cytology of breast lesions and correlation with histopathology-A 2 year study. Int J Health Sci Res.2013;3(2):55-65.

19. Malukani K, Malpani G, Malpani G, Varma AV, Yeshwante PS. Diagnostic Accuracy of Fine Needle Aspiration Cytology in Benign and malignant Breast lesions. IJPO. 2016;3(2):145-151.

20. Tiwari M. Role of fine needle aspiration cytology in diagnosis of breast lumps. Kathmandu Univ Med J. 2007;5(2);215-7.

21. Tse G, Tan HP, and Schmitt F. Fibroadenoma, in Fine Needle Aspiration Cytology of the Breast: Atlas of Cyto-Histologic Correlates. Springer 2013; 65–72.

22. Montezuma D, Malheiros D, Schmitt FC. Breast fine needle aspiration biopsy cytology using the newly proposed IAC Yokohama system for reporting breast cytopathology: The experience of a single institution. Acta Cytol. 2019;63(4):274-79.

23. Shaila KM, Rajesh R, Misra KR, Rai P, Vahikar S, Singhal, P. Comparative evaluation of FNAC, core needle biopsy and excisional biopsy in subtyping of breast lesions. Tropical Journal of Pathology and Microbiology. 2016; 2(1): 9-15.