Al Ameen J Med Sci 2024;17(4):300-305 ● US National Library of Medicine enlisted journal ● ISSN 0974-1143

ORIGINAL ARTICLE CODEN: AAJMBG

Diagnostic accuracy of Fine-Needle Aspiration Cytology (FNAC) in assessing breast swelling: A case series analysis with histopathological correlation

Mohammed Azharuddin[1], Uzma Alvi[2], Shazima Sheereen[3], Abdul Hakeem Attar[2*] and Riyazuddin Alvi[4]

[1]Consultant Pathologist, Triesta HCG Cancer Hospital, Station Road, Kalaburagi-585102, Karnataka, India, [2]Department of Pathology, ESIC Medical College Hospital, Sedam Road, Kalaburagi-585106, Karnataka, India, [3]Department of Pathology, Kasturba Medical College, Manipal Academy of Higher Education, Mangalore, Karnataka, India and [4]Medical Officer, Bhalki Government Hospital, Ambedkar Chowk, Station Road, Bhalki-585328, Karnataka, India

Received: 23rd May 2024; ***Accepted:*** 03rd September 2024; ***Published:*** 01st October 2024

Abstract: *Background:* FNAC is a minimally invasive, cheaper, rapid diagnostic technique. For a long time, open surgical biopsy has been considered the most reliable way to diagnose palpable breast lesions. Undoubtedly, core needle biopsy (CNB) and fine needle aspiration cytology (FNAC) have established themselves as the most preferred and highly effective minimally invasive techniques in medical diagnosis. Their high accuracy rate in diagnosing various medical conditions has made them increasingly popular in recent years. These, A triple diagnostic approach that combines clinical examination, mammography, and fine-needle aspiration cytology (FNAC) is the most reliable method for accurately assessing breast lumps. This approach is widely regarded as the gold standard for definitive breast cancer diagnosis. *Aim:* A prospective study was conducted at the HCG Hospital in Gulbarga to assess the diagnostic accuracy of fine needle aspiration cytology techniques in evaluating breast lesions. *Materials and Methods:* In this research, we studied 100 cases from July 2022 To August 2023. *Results:* The FNAC diagnosis was compared with the histological diagnosis. Fibroadenoma was the most common benign lesion, and invasive ductal carcinoma was the most common malignant lesion. Rare lesions were secretory carcinoma, Galactocele, and atypical intraductal papilloma. *Conclusion:* Breast FNAC is a reliable, simple, and cost-effective first-line diagnostic procedure that is highly accepted by patients and without complications. Due to its simplicity, cost-effectiveness, and good diagnostic accuracy, FNAC is followed as the first-line pre-operative procedure.

Keywords: Breast, Fine Needle Aspiration Cytology, Diagnostic Accuracy of FNAC, Sensitivity, Specificity.

Introduction

Breast lump is the primary symptom in most breast diseases. In India, breast cancer ranks as the second most prevalent cancer in women [1]. They range from benign to malignant lesions. Although benign lesions are common, however, there is no doubt that malignant lesions are increasing, especially in younger women today [2].

Fine needle aspiration cytology was first used as a diagnostic tool in Scandinavian countries (I). It is now a well-established procedure for diagnosing breast, thyroid, lymph nodes, and various organ lesions. Breast lumps worry patients and clinicians, hence the need for reliable, accurate, and quick methods for correct diagnosis [3].

The diagnosis of breast lesions can be challenging as not all are cancerous, and benign lesions may not always develop into cancer. A preoperative evaluation can significantly improve the accuracy of diagnosis. This evaluation may involve physical examination, mammography, fine-needle aspiration cytology, and core needle biopsy [4].

Fine Needle Aspiration Cytology (FNAC) is a highly sensitive, cost-effective, and easy-to-

perform outpatient procedure for breast lumps. FNAC offers several advantages over open tissue biopsy and is a rapid and reliable procedure [1].

Aims and Objectives of Study:

1) To study the spectrum of breast lesions in the rural population of Gulbarga and places near Gulbarga.
2) To know the incidence of inflammatory, benign and cancerous lesions and type of breast lump in young females aged 15-25 years.

Material and Methods

The research was conducted from July 2022 to August 2023 at the Department of Pathology HCG, Kalaburagi, India. The criteria for selecting Patients were.

Inclusion criteria:

1) All females with an unknown primary diagnosis of breast mass.
2) Patients consented to inclusion in the study according to the designed proforma.

Exclusion criteria:

1) Patients with recurrent malignancy.
2) Patients who underwent FNAC did not undergo subsequent histopathological diagnosis.
3) Patients in whom FNAC was either acellular non-diagnostic or inflammatory.
4) Past or current chemo-therapeutic or prevention treatment.
5) Male patients with breast cancer and gynecomastia [2].

The patient's case history was thoroughly documented, encompassing a detailed account of symptoms such as pain, nipple discharge, ulceration of the nipple, and the duration of the lesion. Examining the breast lump involved recording its size, location, consistency, and connection to the skin and underlying tissue. Additionally, any nipple retraction and involvement of regional lymph nodes were carefully noted.

Informed consent was obtained following a comprehensive explanation of the procedure, including its technical details and potential patient benefits. Before fine needle aspiration, the breast skin was sterilised using an antiseptic solution and spirit. The suspected lesion was then stabilised for optimal positioning. The fine needle aspiration procedure involved using a 20 gauge needle fitted on a 10 ml disposable syringe in a syringe holder. After inserting the needle into the lump, negative pressure was created by pulling back the syringe's piston to ensure an adequate sample.

The needle was then manoeuvred back and forth in different directions to provide a thorough examination of the lump. Negative pressure was maintained throughout the procedure in the syringe and resolved before removing the needle from the lump. Post aspiration, the material obtained was smeared on a glass slide with the help of a cover glass. The wet smear was then fixed with an Ether Alcohol mixture and stained using Papanicolaou Stain for further analysis [14]. The air-dried smear was fixed in Methyl Alcohol and stained with May Grunewald Geimsa stain.

Results

In a study of 100 breast lesions, 70 were neoplastic, and 30 were non-neoplastic. Fibroadenoma was the most common benign lesion, while infiltrating ductal carcinoma was the most common malignant lesion. Of the carcinoma cases, 60 were ductal carcinomas, 2 were mucinous carcinomas, 2 were medullary carcinomas, 2 were malignant phyllodes, 2 were secretory carcinomas, 1 was metaplastic carcinoma, and 1 was metastatic IDC.

Among non-neoplastic lesions, there were 16 cases of fibroadenoma, 4 cases of fibrocystic disease, 4 cases of granulomatous mastitis, 2 cases of breast abscess, 1 case of galactocele, and 1 case of breast papilloma.

The study demonstrated a sensitivity of 94.4%, specificity of 92.8%, positive predictive value (PPV) of 97.14%, negative predictive value (NPV) of 86.6%, and an accuracy of 94%.

The table -1 shown most common age group involved was 31-40 years of age.

Table-1: Displays the age distribution of cases presenting with a breast lump		
Age group in years	**No. of cases**	**Percentage (%)**
11-20	04	04
21-30	16	16
31-40	36	36
41-50	25	25
51-60	15	15
61-70	04	04
Total	**100**	**100.0**

In the present study, females were predominantly involved compared to male (table-2).

Table-2: Provides the distribution of cases with breast lumps based on sex		
Sex	**No. of patients**	**Percentage (%)**
Male	02	02
Female	98	98
Total	100	100.0

Table 3 shows the distribution of neoplastic and non-neoplastic lesions based on cytological research. In the present study, there were more number of neoplastic lesions.

Table-3: Distribution of neoplastic and non-neoplastic lesions based on cytological		
Lesions	**Number**	**Percentage %**
Non neoplastic	22	22
Neoplastic	78	78
Total	100	100

Table-4: Displays the distribution of neoplastic and non-neoplastic lesions per the cytological study		
FNAC Diagnosis	**No**	**Percentage (%)**
Non Neoplastic/ Benign		
Fibroadenoma	16	16
Fibrocystic disease	4	04
Breast abcess	02	02
Granulomatous mastitis	04	04
Galactocele	02	02
Duct papilloma	02	02
Malignant		
Infiltrating Breast carcinoma	60	60
Mucinous carcinoma	02	02
Medullary carcinoma	02	02
Metaplastic carcinoma	01	01
Malignant Phyllodes	02	02
Secretory carcinoma	02	02
Metastatic Infiltrating Ductal carcinoma	01	01
Total	100	100

Among neoplastic lesion Fibroadenoma was the most common lesion encounter and least common lesion was Galactocele and Duct Papilloma (Table-4).

Table-5: Displays the statistical index			
The test being evaluated FNAC) Cytology	**Reference standard test (Histopathology)**		**Total**
	Positive Malignant	**Negative Benign**	
Positive Malignant	68	02	70
Negative Benign	26	04	30
Total	94	06	100

In the Present study statistical analysis show majority of true positive cases were malignant (Table-5).

Figure-1 shows Metaplastic carcinoma with squamous differentiation.

Fig-1: Metaplastic Carcinoma

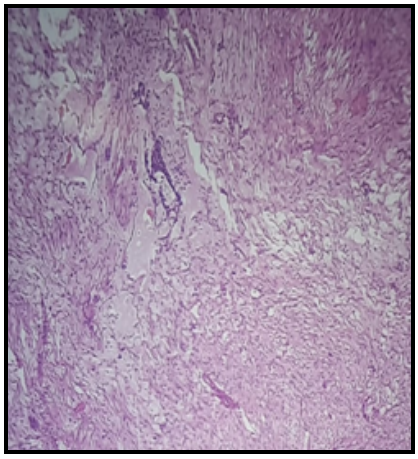


Figure-2 shows Mucinous carcinoma showing chicken wire pattern with singly scattered and clusters of cells in background of mucin.

Fig-2: Mucinous Carcinoma

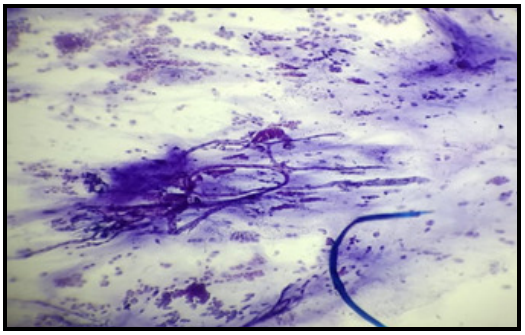


Figure-3 shows Tumor cells in papillary pattern with vacuolated foamy cytoplasm and abundant dense pink.

Fig-3: Papillary Carcinoma

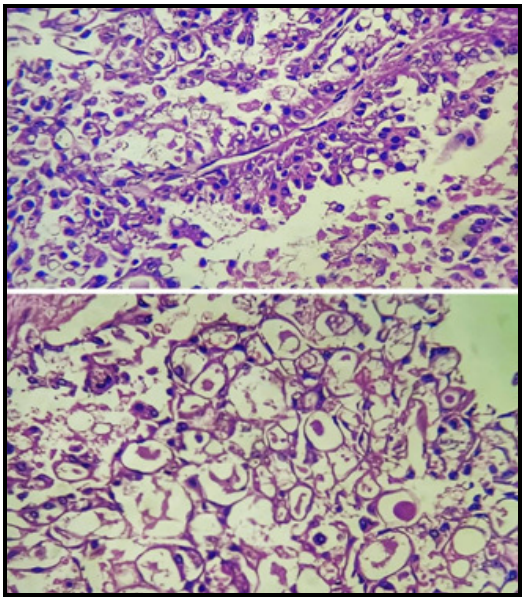


Figure-4 shows Stromal fragments of malignant tumourcells.

Fig-4: Malignant phyllodes tumor

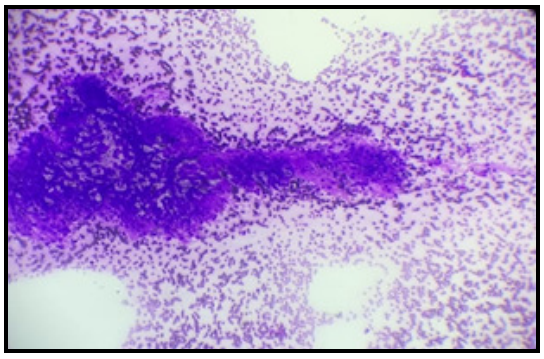
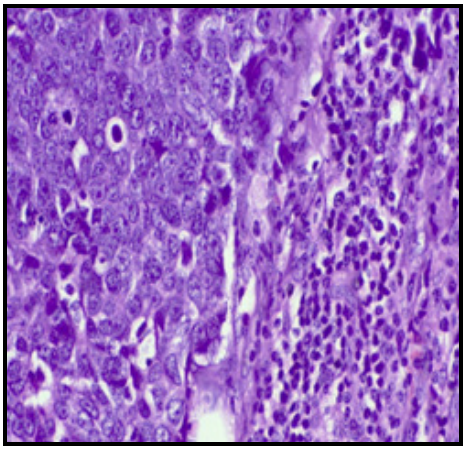


Figure-5 Shows tumour cells showing syncytial growth pattern with high grade nuclei and prominent nucleolus with lymphocytic infiltrate.

Fig-5: Medullary Carcinoma



Discussion

The primary goal of FNAC is to separate benign and malignant lesions so that early diagnosis helps to diagnose and reduces morbidity and mortality [5]. In the present study, HCG cancer centre malignant lesions were more common than in the survey conducted by Hemlata et al [5]. In the present study, the maximum incidence of carcinoma was found in the age group 31-50, similar to the survey conducted by Manas et al. [6].

Fine-needle aspiration cytology is a valuable diagnostic technique for detecting breast cancer because of its accuracy, safety, and affordability. With affordable equipment and a straightforward method, it is possible to obtain prompt on-site reports that require minimal expenses. Fine needle aspiration cytology (FNAC) offers several advantages over traditional tissue biopsy. It rapidly provides highly accurate results and is less invasive than a tissue biopsy. In the case of breast FNAC, it can significantly reduce the need for open breast biopsies [2].

The youngest patients in the study were two 10-year-old females with fibroadenoma and the oldest female was 80, an 80-year-old female with infiltrating ductal carcinoma breast. The most common lesion in the present study was a fibroadenoma, similar to the study

conducted by Shobha et al [2]. The most common malignant lesion encountered was infiltrating Ductal carcinoma, which was identical to the study conducted by Adetola [7]. In the present study, there were two cases of fibroadenoma (false positive), similar to the study conducted by Adetola. The sensitivity of the present study was 94%, identical to the study conducted by David et al [8], in which sensitivity was 100%. The accuracy of the present study is similar to that of Feichter et al [11] (Table-6).

Table-6: Comparison of statistical analysis with various studies

Author	Sensitivity	Specificity	Positive predictive value	Accuracy	Negative predictive value
KlineTS et a[9]	89.5%	92.5%	85.33%	91.63%	-
Francisco D et al[10]	93.49%	95.73%	93.49%	98.75%	95.73%
Feichter et al [11]	86%	99.3%	99.3%	93%	85%
Premila De SR et al[12]	93.8%	98.21%	92.70%	97.40%	-
Zhang Qin [13]	97.1%	97.3%	-	9.2%	-
Arjun Singh et al [14]	84.6%	100%	-	92.3%	-
Bukhari et al [4]	98%	100%	97%	98 %	100%
Present study	94.4%	92.8%	96.6%	93.3	86.6%

Conclusion

FNAC is a simple and accurate diagnostic procedure that involves minimal invasion. It is well-tolerated by patients and has a low risk of complications. It is a repeatable method widely used to diagnose malignant and non-malignant breast lesions. FNAC is a safe and reliable procedure that offers a quick and cost-effective diagnosis of breast lesions. Repeated passes should be made for a greater yield of cytological material. Utilising Fine Needle Aspiration Cytology (FNAC) at an early stage and with greater frequency can reduce the diagnostic interval for breast malignancies, enabling more timely therapeutic interventions.

Financial Support and sponsorship: Nil

Conflicts of interest: There are no conflicts of interest.

References

1. Badge SA, Ovhal AG, Azad K, Meshram AT. Study of fine-needle aspiration cytology of breast lumps in rural area of Bastar district, Chhattisgarh. *Medical Journal of Dr. DY Patil University.* 2017; 10(4):339-342.
2. Shobha SN, Rajashekar YR. Role of FNAC in Breast Lesions. *Journal of Diagnostic Pathology and Oncology.* 2017; 2(1):3-5.
3. Singh K, Sharma S, Dubey VK, Sharma PR. Role of FNAC in diagnosis of breast lumps. *JK science.* 2001; 3(3):126-128.
4. Bukhari MH, Arshad M, Jamal S, Niazi S, Bashir S, Bakhshi IM, Shaharyar. Use of fine-needle aspiration in the evaluation of breast lumps. *Patholog Res Int.* 2011; 2011:689521.
5. Kamra HT, Rana P, Kaur S, Verma S, Munde S, Ahuja K, Singh K. Spectrum of breast lesions diagnosed on fine needle aspiration cytology in rural population of Khanpur Kalan, Sonepat (Haryana). *Ann Int Med Den Res.* 2017; 3(3):06-09.
6. Madan M, Sharma M, Mannan R, Manjari M, Kaur J, Garg S. Cytomorphological study of spectrum of breast lesions and determination of efficacy of FNAC in the diagnosis of various breast lesions. *J Evol Med Dent Sci.* 2015; 4(55):9581-9587.
7. Daramola AO, Odubanjo MO, Obiajulu FJ, Ikeri NZ, Banjo 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.
8. Ibikunle DE, Omotayo JA, Ariyibi OO. Fine needle aspiration cytology of breast lumps with histopathologic correlation in Owo, Ondo State, Nigeria: a five-year review. *Ghana medical Journal.* 2017; 51(1):1-5.
9. Kline TS, Joshi LP, Hunter SN. Fine needle aspiration of the breast: diagnoses and pitfalls. *Cancer.*1979; 44:1458-1464.

10. Dominguez F, Riera JR, Tojo S and Junco P. Fine needle aspiration of breast masses, an analysis of 1398 patients in a community hospital. *Acta Cytological.* 1997; 41(2):341-347.
11. Feichter GE, Haberthur F, Gobat S, DalquenP .Statistical analysis and cytohistologic correlations. *Acta Cytologica.* 1973; 17:188-190.
12. Rocha PS, Nadkarni NS and Menez S. Fine needle aspiration biopsy of breast lesion and histopathologic correlation. *Acta Cytologica.* 1997; 41.
13. Zhang Q, Nie S, Chen Y et al. Fine Needle Aspiration Cytology of Breast Lesions: Analysis of 323 Cases. *Chinese-German J Clin Oncol.* 2004;3:172-174.
14. Singh A, Haritwal A and 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):1-6.

Cite this article as: Azharuddin M, Alvi U, Sheereen S, Attar AH and Alvi R. Diagnostic accuracy of Fine-Needle Aspiration Cytology (FNAC) in assessing breast swelling: A case series analysis with histopathological correlation. *Al Ameen J Med Sci* 2024; 17(4): 300-305.

*All correspondences to: Dr. Abdul Hakeem Attar, Professor, Department of Pathology, ESIC Medical College Hospital, Sedam Road, Kalaburagi-585106, Karnataka, India. Email: uzmaalvi786@gmail.com