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Original Research Article

Sensitivity and Specificity of fine-needle aspiration cytology (FNAC) in diagnosis of Breast lesions

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Abstract: Growing incidence of Breast cancer is seen especially in young women and greater numbers of women are likely to consult for breast masses with increasing awareness about breast cancer. With this background we tried to evaluate the Sensitivity and Specificity of Fine-needle aspiration biopsy when compared with Histopathology in diagnosis of Breast lesions. This study was conducted in Chalmeda Anandarao Institute of Medical Sciences [CAIMS] Karimnagar. FNAC was performed in all suspected breast masses using 23 Gauge Needle attached to 20 ml disposable syringe. Smear was prepared on standard glass slides fixed and stained with Haematoxyline and Eosin stain. The cases were reported using 5 tier system C1-C5. Histopathology examination of the same was also done to confirm the diagnosis. 88 patients were studied in this process age ranging from 35 to 60 years, the cases were reported using a 5 tier system C1 for inadequate; C2 for benign; C3 for suspicious probably benign; C4 for suspicious probable malignant and C5 for malignant lesions. Out of (n=88) C1 were (n=1) 1.14%, C2 were (n=45) 51.13%, C3 were (n=22) 44%, C4 (n=13) 14.77% and C5 (n=7) 7.9%. Out these 88 samples by histopathology (n=67) 76.13% were found to be Benign and (n=21) 23.86%. Sensitivity was 87.5% CI= 67.64% to 97.34%, Specificity was 97.1% CI= 89.92% to 99.65%. FNAC is a rapid relatively painless and low cost and acceptable procedure that can be done on out-patient basis. It can be done on both superficial as well as difficult located lesions. The overall sensitivity, specificity and predictive values are within acceptable range provided standard procedures are adopted.
Keywords: Sensitivity, Specificity, Fine Needle Aspiration Cytology (FNAC)

INTRODUCTION

Palpable breast masses are the most common pathologies encountered in female patients. Lack of awareness and low suspicion is the main cause of diagnostic delays and development of breast cancer. The traditional method of diagnosis is by excision biopsy of the mass and arrival at conclusive diagnosis. In 1930 Martin and Ellis first introduced fine-needle aspiration cytology [FNAC] in the diagnosis of palpable breast masses. Since then it has become an important tool in evaluation of breast lesions [1]. Breast cancers are second most common malignancies in females in India after Cancer of Cervix [2]. The breast malignancies are relatively easy to detect at early stages and effective treatment can be given in form of conservative surgery and chemotherapy. Worldwide initiation of triple assessment which comprises of Clinical, Radiological and Pathological assessment [3-5]. Several countries have now adopted this triple line assessment approach and FNAC is the first line of pathological diagnosis of breast lesions both for screening as well as symptomatic patients [6].

FNAC advantages like rapidity of diagnosis, high acceptance, cost effective, ability to sample multiple areas in single sitting. In addition therapeutic aspiration is also possible in case of cyst. FNAC be employed in both palpable and non-palpable lesions of the breast, and it is relativity safe procedure with lower rates of procedure related complications. However, hematoma formation, infection or sometimes pneumothorax (especially after axillary lymph node FNAC) can be associated with FNAC [7]. The major limitation of FNAC is its inability to diagnose some benign or borderline breast lesions and their distinction from the malignant lesions. Pre-neoplastic lesions such as atypical ductal hyperplasia or in-situ changes cannot be confidently picked up by FNAC, and its distinction

from an invasive malignancy is also very difficult to detect. Similarly, benign lesions inducing extensive sclerosis, such as sclerosing adenosis, have long been considered to be the dark areas of cytopathologist [8, 9]. Another major limitation is the highly variable range of sensitivity and diagnostic accuracy of FNA smears depending on the experience of the cytopathologist. A variable and sometimes high rate of false negativity due to sampling error or error of interpretation has also prompted many clinicians to raise fingers against the efficiency of FNAC. Based this background we tried to establish sensitivity and specificity and overall value of FNAC in diagnosis of breast lesions.

MATERIALS AND METHODS

This study was done in Chalmeda Anandrao Institute of Medical [CIAMS], Karimnagar. Ethical permission for the study was obtained from the college Ethical committee and consent of participation in study was obtained from the patients after explaining the procedure. Patients (n=88) Age 35-60 years were selected for the study based on inclusion and exclusion criteria. Inclusion criteria were all female with palpable breast lumps, with no history of previous breast lesions or surgical procedures, No history of other malignancies. Exclusion criteria were patients with history of previous surgical procedures on breast, those with recurrent growths and those who were not willing to participate. FNAC was performed using 23 Gauge needle attached to 20 ml disposable plastic syringes. The procedure of aspiration was explained to the patient before handle to make him/her comfortable. Take all the aseptic precautions, than the needle was slowly introduced into the swelling from one side after fixing the swelling with the other hand. With suction created by the retraction of plunger the needle was gently drawn out and pushed into the lesion repeatedly. Areas of softness were avoided for aspiration as it yields scanty tissue. The needle was withdrawn from the lesion with the plunger in its normal position. Care is taken to prevent from entering the barrel of the syringe as far as possible. The needle was then detached from the syringe, and the plunger is retracted to draw air into it. The needle was reattached to the syringe and the contents were transferred on to the slide. Then smears were made by crushing the tissue by using another slide and spread. The samples were smeared on standard microscopic glass slides, fixed and stained with Haematoxyline and Eosin. The cases were reported using a 5 tier system C1 for inadequate; C2 for benign; C3 for suspicious probably benign; C4 for suspicious probable malignant and C5 for malignant lesions. Sample for Biopsy was also obtained from all the selected patients in order to correlate the FNAC with Biopsy.

RESULTS

Total No. of 88 female patients were selected for the study as per Inclusion and Exclusion criteria. The age wise distribution of the patients is given in the Table 1. The most common age group involved was 46 to 50 years having highest number of patients indicating these age group is more involved in breast related Pathologies.

Table 1: Age wise distribution of Patients

Sl. No.	Age Group in Yrs	No of Patients	Percentage
1	35 – 40	11	12.5
2	41 – 45	25	28.43
3	46 - 50	28	31.81
4	51- 55	15	17.04
5	56- 60	9	10.22
Total	----	88	100

The patients were reported as per the 5-tier system of reporting of FNAC, from C1 to C5 and the accordingly they were compared with Histopathology (Benign and Malignant). The details of which are given in the table 2.

Table 2: Comparison of cytological and histological diagnosis of breast lesions

		Histopathology	
Diagnosis	Cytology	**Benign**	**Malignant**
C1	1 (1.13%)	1	0
C2	45 (51.13%)	44	1
C3	22 (25%)	20	2
C4	13 (14.78%)	1	12
C5	7 (7.9%)	1	6
Total	**88 (100%)**	**67**	**21**

The sensitivity and specificity of FNAC was calculated in comparison with the Histopathology lesions and the sensitivity was found to be 87.5% CI (67.64% – 97.34%) and Specificity of FNAC is 97.10 CI (89.92% - 99.65%). The Positive Predictive Value (PPV) is 97.3% and the Negative Predictive Value (NPV) 97.51%.

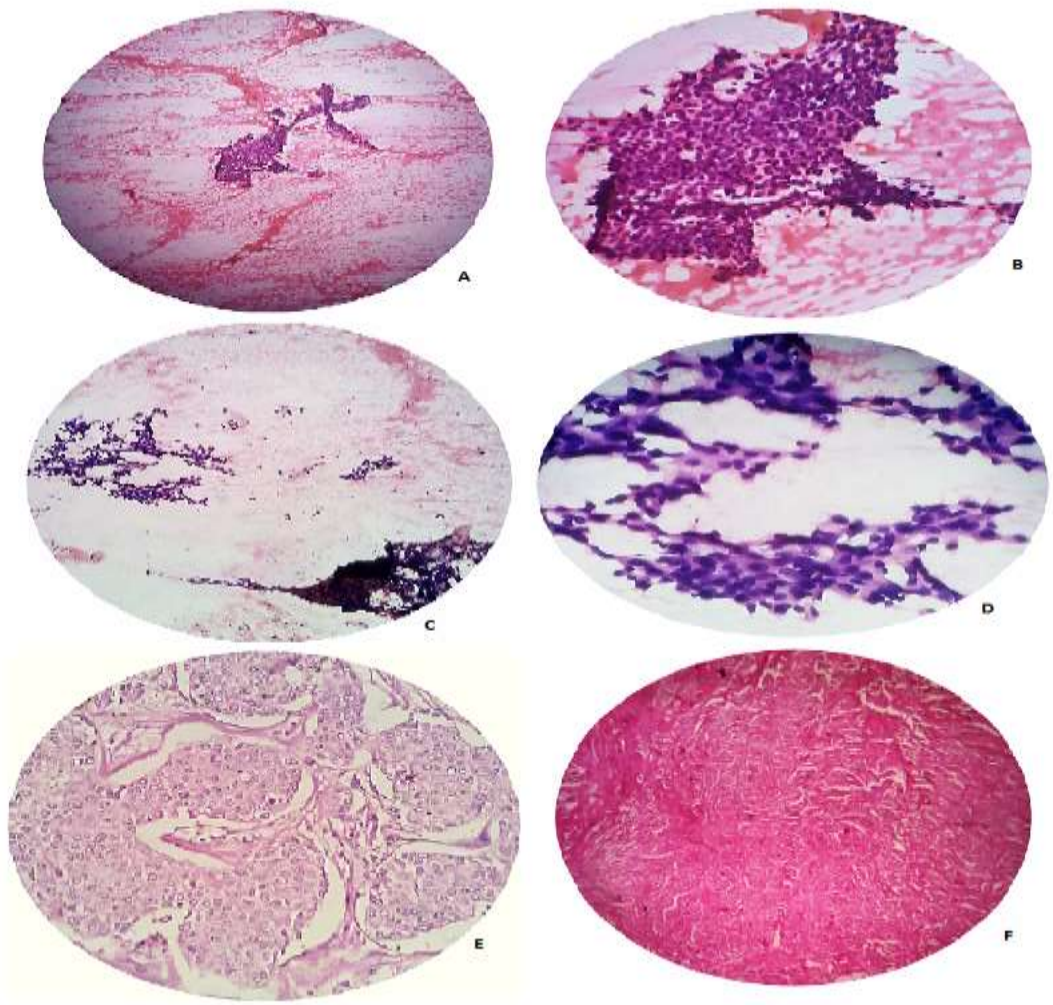

Fig A & B: FNAC showing Fibroadenoma. Fig C & D: FNAC showing infiltrative ductal cell carcinoma. Fig E & F: Histopathology of Infiltrative ductal cell carcinoma

DISCUSSION

FNAC is a useful tool for evaluation of breast lesions especially when located in superficial as well as difficult sites and where rapid diagnosis of breast lumps is required [10]. We in the present study tried to evaluate the sensitivity and specificity of FNAC compared to standard histopathology. In this study we found the sensitivity of FNAC to be 87.5% various other studies have reported sensitivity of FNAC varying from 77% to 97% [11-15]. There are several factors influencing sensitivity which includes the experience of cytopathologist. FNAC generally in experienced hands can attain high levels of sensitivity and specificity and low false positive or false negative rates. Other factors affecting sensitivity includes the palpability of lesions, size of lesions and nature of lesion. The UK guidelines of complete sensitivity of > 80%, positive predictive value of >95% false negative rate of <5%, False positive <1% [16] has been shown; it proves that FNAC is an effective and good diagnostic procedure.

The Specificity of FNAC in our study was 97.1% several other studies have reported specificity of FNAC range from 92- 99% [17-19]. One study by Hatada *et al.;* has reported very low specificity [20]. The positive predictive value of our study was 91.3% and most of the similar studies have reported the positive predictive values above 90% [21, 22] and some studies have reported range from 99-100%. [17, 23] The false positive value in our study was reported to be 0.22% other studies have shown similar results which indicate low false positive values of FNAC ranging from 0 to 2.5% [18,19,24]. The false negative value of our study was 0.34% values have been reported in other studies but the values are in higher range from 5 – 10% and one study have also shown the value of 15%.

Lesions missed during aspiration are the common cause of false-negative cytological diagnosis [3]. Certain carcinomas which include lobular carcinoma are responsible for false-negative results. [3] Invasive lobular carcinomas are generally associated with high rates of false negative results [25]. This could be because of lobular carcinomas are more likely to yield pauci cellular smear with rare intact epithelial cells [25]. Fibroadenomas are the common cause of false positive results because of presence of occasional isolated intact cells with dissociation with epithelial nuclear atypia and high cellularity [26].

CONCLUSIONS

FNAC is a rapid relatively painless and low cost and acceptable procedure that can be done on out-patient basis. It can be done on both superficial as well as difficult located lesions. The overall sensitivity, Specificity and predictive values are within acceptable range provided standard procedures are adopted.

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