

# A statistical analysis and cytohistologic correlation of fine needle aspiration cytology in lesions of male breast

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## ABSTRACT

**Background and Objectives:** Fine needle aspiration cytology is a widely used first line investigation for breast lesions in surgical practice. Gynecomastia is the most common lesion of male breast. FNAC is usually asked for male breast lesions in case of unilateral breast enlargement to rule out malignancy. This study was done to obtain sensitivity, specificity, other statistical parameters and cytohistological correlation in FNAC of male breast lesions so as to know its diagnostic utility.

**Methods:** Study was performed at Goa medical college over a period of seven years. Only the cases with availability of histological diagnosis were included in the study. All slides were stained with Hematoxylin and eosin after fixation in alcohol-ether mixture. Results: Sensitivity, specificity, accuracy, positive predictive value and negative predictive value were 100% for FNAC of male breast lesions. Excellent cytohistologic correlation was also observed.

**Conclusion:** These results indicate that FNAC of male breast lesions shows excellent specificity, sensitivity and cytohistologic correlation. Hence, it can be used in initial diagnostic workup of lesions of male breast

**Keywords:** Fine needle aspiration cytology, Male Breast lesions, Statistical analysis

## INTRODUCTION

Lesions of male breast are not as common as lesions of female breast. Majority of lesions that come to surgical practice are gynecomastia and carcinomas. Other lesions are extremely rare and include fibro epithelial tumors, Duct ectasia, papilloma and fibrocystic change. This study was undertaken to calculate sensitivity, specificity and other statistical values so as to know whether it is sufficiently accurate to be used for diagnosis of male breast lesions.

Fine needle aspiration cytology (FNAC) is an established technique for investigation of lesions all over body including lesions of male breast and is in widespread use. FNAC has high diagnostic accuracy when performed and interpreted by experienced cytopathologists so that it can be used for diagnostic workup of lesions of male breast.

FNAC can be performed as an OPD procedure, is less traumatic to the patient than surgical biopsy, is cost effective and can provide rapid results on the same day. It makes this procedure suitable for initial management of the patients.

## MATERIALS AND METHODS

Fine needle aspirations were done at the FNAC clinic of Goa Medical College, Goa over a period of seven years (from 1993 to 1999). Histopathology and cytology details were obtained retrospectively from the pathology department records of Goa Medical College. During this period, a total of 57 FNACs were done in male patients. Confidentiality of subjects was assured as patient name and initials were not collected. Only those cases, which had both cytology and histopathological examination performed, were included for this study. Sensitivity, specificity and accuracy, Positive and negative predictive value were calculated from the data. Cytohistologic correlation was also performed. Inconclusive cases were not considered for calculation of cytohistologic correlation, sensitivity, specificity, accuracy and other statistical parameters.

FNAC procedure was performed with the help of Cameco pistol type holder as was the practice in the department for all the FNACs. A 10 milliliter disposable syringe was used with 21/23 gauge needle in each case. The syringe was fitted into the Cameco type pistol holder. 2-4 needle passes were made in every case. Slides were fixed in alcohol – ether mixture (equal parts of ether and 95% ethanol) and stained with Hematoxylin and eosin. Hematoxylin staining was done for 10 minutes and eosin staining for 2 minutes. Other steps were as for histopathology section staining including hydration, Hematoxylin staining, rinsing, decolorization in acid alcohol, rinsing in tap water, staining in eosin, dehydration,

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clearing and mounting. Air dried smears were also prepared and stained with Wright stain. Wright stain procedure included initial staining in Wright stain for 2 minutes, followed by dilution with buffered water for 4 minutes, rinsing in distilled water, drying and mounting. All FNACs were performed by pathologist. For statistical studies, histopathological and cytological diagnosis were classified into benign specific, benign non-specific, malignant specific and malignant non-specific. Briefly, benign specific included cases in which a specific diagnosis e.g gynecomastia was given. Benign non – specific included diagnosis such as benign breast lesion. Diagnosis was classified as malignant specific when specific diagnosis of malignancy e.g carcinoma was made. Malignant non-specific was for instances where diagnosis did not specify type of malignancy e.g if diagnosis was given as positive for malignancy. Sensitivity, specificity, positive predictive value, negative predictive value and accuracy were calculated. Cytohistologic correlation was also done. For the purpose of cytohistologic correlation, complete agreement between cytology and histology specific diagnosis was considered as full correlation. Where complete agreement between cytology and histology specific diagnosis was not observed, it was considered as no correlation.

**Observations:**

Out of a total of 57 FNACs done in male patients, cytology and subsequent histopathology reports were available in 26 cases of FNACs of male breast lesions during the period of study. Majority of patients (84.6%) had unilateral breast swelling. Histopathology specimens submitted included lumpectomy in most of the cases. Age of the patients ranged from 17 to 78 years.

**Results of cytological examination:** Out of 26 FNACs, 19 (73%) had a benign diagnosis. A malignant diagnosis was rendered in 3(11.5%) cases. In 4 (15.3%) cases, smears were inconclusive and in these cases, biopsy was advised (Table 1).

Nineteen cases (73%) that had a benign diagnosis included 14 (53.8%) cases of gynecomastia, 1 (3.8%) case of lipoma, 1 (3.8%) case reported as benign breast lesion, 2 (7.6%) cases reported as no evidence of malignancy and 1(3.8%) case of breast abscess (Table 2).

**Results of Histopathological examination:** Out of these 26 cases, 22 (84.6%) were given benign diagnosis. 4 (15.3%) cases had a malignant diagnosis (Table 1).

**Results of cases advised biopsy:** Out of 4 cases in the inconclusive category that were advised biopsy, 1 case (25%) proved malignant on histopathological examination while 3 cases (75%) had a benign diagnosis (Table 1).

**Statistical analysis:** Out of 22 cases (excluding inconclusive cases), 3 cases (100%) were true positive and none of the cases was false positive. The number of true negative cases was 19(100%). There were no false negatives. Sensitivity and specificity of test was 100%. Positive and negative predictive value was 100%. Accuracy of the test was 100% (Table1).

**Cytohistologic correlation:** Three cases diagnosed as invasive ductal carcinoma on breast FNACs were diagnosed as invasive ductal carcinoma on Histopathological examination yielding 100% correlation. Cytological diagnosis of invasive ductal carcinoma showed 100% correlation. Gynecomastia and breast abscess also showed 100% correlation. However, no correlation was observed in benign breast lesion and no evidence of malignancy category both of which were diagnosed as gynecomastia on histopathology (Table 2).

**Inconclusive smears:** Inconclusive smears were observed in 4(15.3%) of all cases. All of these cases were unsatisfactory due to very poor cellularity. Out of these, one case was diagnosed as malignant (invasive ductal carcinoma) and 3 cases were diagnosed as gynecomastia on histopathological examination. Rate of inconclusive smears was more in malignant than benign lesions (Table 3).

**Table 1: Cytologic and Histopathologic Categories of 26 FNACs and Statistical Analysis**

Cytology	Histology	
	Positive( malignant)	Negative( benign)
Benign ( 19)	0=False negative(0%)	19= True negative(100%)
Malignant(3)	3= True positive(100%)	0= False positive(0%)
Advised biopsy/inconclusive(4)	1(25%)	3(75%)
Total(26)	4(15.4 %)	22(84.6 %)

$$\text{Sensitivity} = \frac{TP}{TP+FN} \times 100 = \frac{3}{3+0} \times 100 = 100\%$$

$$\text{Specificity} = \frac{TN}{TN+FP} \times 100 = \frac{19}{19+0} \times 100 = 100\%$$

$$\text{Positive predictive value} = \frac{TP}{TP+FP} \times 100 = \frac{3}{3+0} \times 100 = 100\%$$

$$\text{Negative predictive value} = \frac{TN}{TN+FN} \times 100 = \frac{19}{19+0} \times 100 = 100\%$$

$$\text{Accuracy} = \frac{TP+TN}{TP+FP+TN+FN} \times 100 = \frac{3+19}{3+0+19+0} \times 100 = 100\%$$

**Table 2: Cytohistologic correlation of lesions (Total number of cases = 22 excluding inconclusive cases)**

FNAC diagnosis	Cases	Histopathology diagnosis	Cases	Agreement
Invasive ductal carcinoma	3	Invasive ductal carcinoma	03	100%
Gynecomastia	14	Gynecomastia	14	100%
Breast Abscess	01	Breast abscess	01	100%
Benign breast lesion	01	Gynecomastia	01	0%
No evidence of malignancy	02	Gynecomastia	02	0%
Lipoma	01	Lipoma	01	100%
Total	22	Total	22	

**Table 3: Histopathologic categories of inconclusive smears**

	Total Number of cases	No. of inconclusive smears
Histopathological diagnosis		
Malignant	04	01(25%)
Benign	22	03(13.6%)
Total	26	04(15.3%)

**DISCUSSION**

FNAC of male breast lesions is a diagnostically useful procedure. It is cost effective, involves minimal discomfort to the patient and can be performed on outpatient basis. Report can be available on the same day, thus minimizing anxiety of patient.

In this study, a statistical analysis of FNAC in male breast lesions and cytohistologic correlation was performed. Sensitivity, specificity, accuracy, positive and negative predictive value for diagnosis of malignancy was 100%. In other studies, sensitivity ranges from 87% to 100%.<sup>[1,2,3]</sup> Specificity is also reported very high, ranging from 78% to 100%.<sup>[1,2,3]</sup> Positive predictive value, in studies done, ranges from 89% to 100%.<sup>[1,3,4]</sup> Our results compared very well with those reported in the literature. These results show that FNAC is a highly accurate procedure for diagnosis of male breast lesions.

Inconclusive smears constituted 15.3% of all FNAC smears. In the literature, inconclusive smears represented 8-22% of all smears.<sup>[1,2,3]</sup> Inconclusive smears in our study showed very poor cellularity, thus preventing satisfactory interpretation. Hence, these can also be considered as unsatisfactory smears. FNAC is a blind procedure and is not always able to sample the lesion in question. Another reason is intrinsic nature of the lesion. Lesions with abundant fibro connective tissue sometimes do not provide enough epithelial cells for interpretation in case of FNAC breast (especially seen in cases of gynecomastia). Malignancies with desmoplasia also yield poor cellularity.

Cytohistological correlation in our study was 100% in gynecomastia, invasive ductal carcinoma and breast abscess and lipoma. However, no correlation was seen in two cases of gynecomastia

where cytological diagnosis given was no evidence of malignancy (non-specific benign diagnosis) and a case of gynecomastia cytologically diagnosed as benign breast lesion (non-specific benign diagnosis). Confident diagnosis of gynecomastia requires presence of cohesive epithelial cell sheets and bare nuclei in the background. In the three cases that did not show correlation, only cohesive sheets of epithelial cells were seen. Hence, these were interpreted as benign breast lesion and as no evidence of malignancy by the reporting pathologists to convey benign nature of the lesions, as diagnosis of gynecomastia was not possible in these cases.

Gynecomastia can show some degree of epithelial cell atypia. However, presence of cohesive epithelial cell sheets, bare nuclei and fibro adenoma like pattern prevents over diagnosis of these cases as malignancy. No diagnostic pitfalls were encountered in this study. One of the reasons may be that cases with very low cellularity were classified as inconclusive and no effort was made to render diagnosis on such insufficient smears. Another reason might be that FNAC was done and reported by same pathologist resulting in good clinic opathologic correlation of the findings.

In this study, only those cases were included in which subsequent histopathologic examination was also available. This was done as histopathology is considered as the gold standard for comparing accuracy of cytology diagnosis.

To summarize, FNAC in male breast lesions provides extremely high sensitivity, specificity and accuracy in the diagnosis of male breast lesions. It shows good cytohistologic correlation. Hence, it is the investigation of choice in workup of male breast lesions. Also, it is recommended that FNAC should

be performed and reported by same pathologist whenever possible and permitted by the resources.

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