Original Research Article

A comparative study of FNAC breast lesions and BI-RADS grading with a focus on grade 4 and grade 5 categories

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Abstract

Breast carcinoma is showing an increasing trend amongst urban women population. Breast Imaging Reporting and Data System (BI-RADS) is a widely accepted risk assessment procedure for carcinoma breast in clinical practice. Fine needle aspiration cytology (FNAC) is an established and important preoperative diagnostic modality. We have done a two year comparative study of these two procedures in the department of Pathology, at Gandhi Hospital from June 2014 to May 2016. We have done 720 FNACs for breast lesions during this period and compared the results with BI-RADS classification by mammography / ultrasound screening at the department of radiology, Gandhi Hospital. Out of total 720 patients who underwent FNAC, BI-RADS grading was available for only 540 cases. Cytological patterns were compared with BI-RADS grading for these 540 cases. The Concordance and Discordance among these findings are discussed with special emphasis on grade 4 and Grade 5 BI-RADS lesions in which carcinoma breast risk is high.

Key words

Carcinoma Breast, BI-RADS grading, FNAC Breast, Concordant malignancy, Discordant Benign lesions.

Introduction

Breast lesions are commonly encountered lesions in surgical pathology. With increasing incidence of carcinoma breast, high level of pre-operative diagnostic accuracy has become highly imperative. The highest level of preoperative diagnostic accuracy of breast lesions can be achieved using a triple approach. This concept combines the results of imaging, clinical examination and FNAC. When all the three are combined, the level of accuracy exceeds 99% [1, 2]. The Breast Imaging and Data system (BI-RADS) developed by the American College of Radiology (ACR) has standardized the assessment and reporting of breast lesions. BI-RADS is designed to reduce confusion in breast imaging interpretation. It contains a lexicon of standardized terminology (description) for mammography, breast ultrasound and MRI as well as chapters on report organization and guidance, chapters for use in daily practice [3, 4]. The ultrasound lexicon has many similarities to mammography lexicon but there are some descriptors that are specific for ultrasound [4]. Category 3 lesions are judged to have 2% or less probability of malignancy. While for BI-RADS 4 category lesions, a wide range of positive predictive value (3% to 94%) is suggested which is problematic in reporting the lesions [5]. However, a new recommendation in the fourth edition of BI-RADS has subdivided the category 4 lesions internally in to 3 subgroups (4a, 4b and 4c) on the basis of likelihood of malignancy. BI-RADS lexicon did not set out specific guidelines regarding what was the risk of malignancy for each of these subcategories should represent [5]. But Bent, et al. suggested that the risk of malignancy is 2-10% for category 4 a, 11-50% for category 4b and 51-95% for category 4c [5].

Concordant BI-RADS 4 (suspicious Vs Malignant) indicates a lesion which demonstrated suspicious findings for malignancy on ultrasound/ mammographic examination and diagnosed to be malignant by pathological analysis [5]. Discordant BI-RADS 4 (suspicious Vs Benign) indicates a lesion that is categorized as BI-RADS 4(suspicious Vs benign) on imaging and FNAC revealed no definite malignancy but has increased risk for development of malignancy [5].

Category 5 lesions on imaging have more likelihood of malignancy than category 4 and always been used to identify the lesions that almost certainly malignant [6]. Concordant BI-RADS 5(Malignant Vs Malignant) indicates a lesion which demonstrated highly suggestive findings for malignancy on ultrasound/ mammography and diagnosed to be malignant lesions by pathological examination [5]. Discordant BI-RADS 5 (Suspicious/ Benign) indicates a lesion which is suspicious of malignancy on imaging but revealed benign pathology on FNAC [5]. Border lesions on grade 4 and 5 lesions on imaging are the one which do not show definite benign or malignant Pathology but have high risk of development of malignancy eg: Atypical ductal hyperplasia, atypical ductal papilloma, Radial Sclerosing Lesion and possible Phyllodes tumors [5].

Imaging-Pathology correlation is also of critical importance in Imaging- guided breast biopsies to detect possible sampling errors and avoid diagnostic delay. It was shown that a core biopsy is superior to FNAC in terms of sensitivity and specificity. However quick, cheap and basic diagnosis by FNAC cannot be undermined. FNAC is an established diagnostic procedure for breast lesions, in experimental hands can achieve a very high sensitivity, specificity and low false positive or false negative results [7]. Finally a strong working relationship between radiologist and pathologist is important for imaging – pathology correlation. It is emerging as an integral part of multidisciplinary diagnostic approach for breast lesions and important in establishing the pre surgical diagnosis and careful planning of surgical protocol.

Aim and objectives

- To compare and correlate the FNAC findings of breast lesions with BI-RADS grading on Mammography / ultrasound or both.
- To find out the concordance/ discordance in various breast lesions between FNAC findings and BI-RADS grading with special focus on category 4 and 5 lesions.

Materials and methods

Present study was conducted in the department of Pathology, Gandhi Medical College/Hospital for a period of 2 years from June 2014 to May 2016. All breast lump cases for which FNAC done were included in the study. All the above cases for which BI-RADS grading were also done by imaging, either by Mammography or Ultra Sound or both in the Department of Radiology, Gandhi Hospital are also included in our study. FNAC smears are fixed by 95% Isopropyl alcohol and stained by H&E. FNAC cases in which only blood or no material obtained are excluded from study.

Results

A total no. of 720 patients underwent FNAC procedure for breast lumps in the department of Pathology, Gandhi Hospital/Gandhi medical college for a period of 2 years, out of which 540 patients underwent ultrasonography or mammography for BI- RADS grading. Among 720 FNAC cases 77.5% lesions reported to be benign origin, 17.7% were found to be malignant where as 4.8% were borderline cases. Out of the 540 patients who have taken up both FNAC and Radio-imaging, 340 (62.9%) patients reported to be having BI-RADS II and III lesions which revealed 98.9% benign morphology on FNAC. The majority of these benign cases included Fibro adenoma followed by fibrocystic disease. The remaining 200 cases out of 540 cases for which ultrasonography and mammography were done, reported to be BI-RADSD IV and V category (**Table - 1, Figure - 1**).

Table – 1: BI-RADS category.

Category		Benign	Malignant	Borderline	Total
BI-RADS	I	5			5
BI-RADS	II	285			285
BI-RADS	III	50			50
BI-RADS	IV	75	30	15	120
BI-RADS	V	4	66	10	80

Table – 2: Various lesions in category II and III.

Lesion	BI-RADS grading- II, III	FNAC morphology	Correlated cases %
Fibroadenoma	118	117	99.1%
Fibrocystic disease	60	58	96.6%
Galactocele	18	17	94.4%
Ductectasia	55	54	98.1%
Ductal papilloma	20	19	95%
Granulomatous lesions	25	25	100%
Abscess	36	36	100%
Lipoma	3	3	100%
Total	336	330	

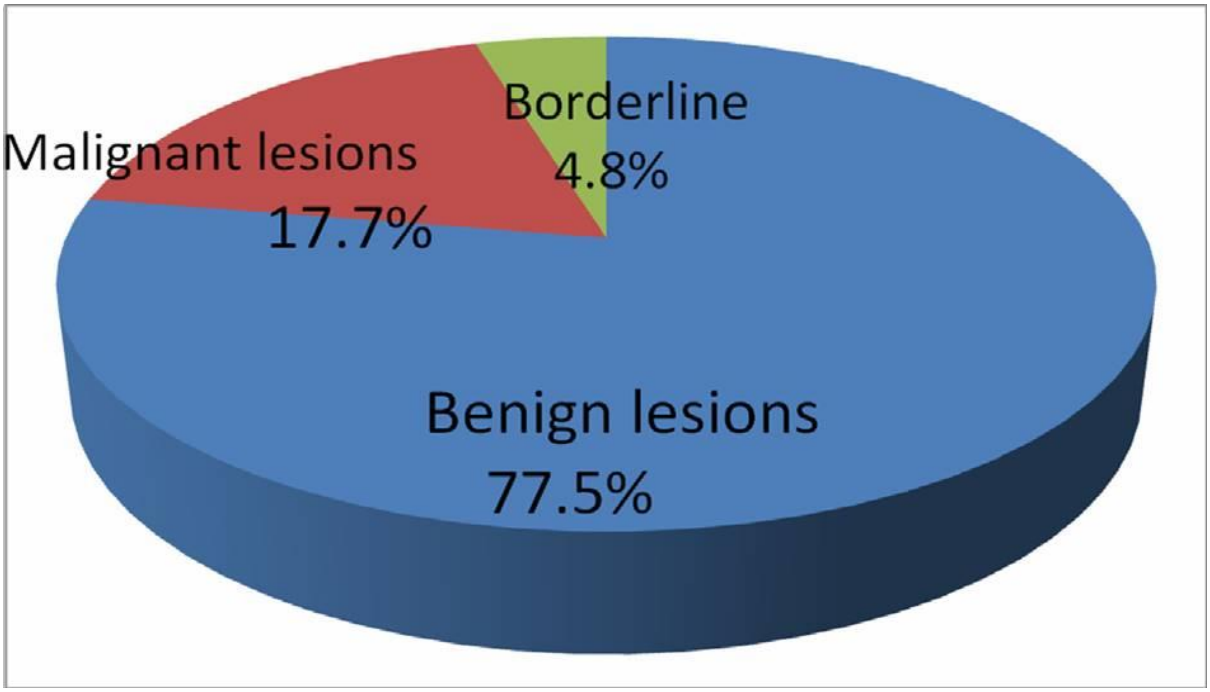
Table - 3: Correlation between ultrasound and mammography findings and FNAC results in BI-RADS IV and V.

	Ultrasound vs FNAC	**No of cases**	**%**
Concordant BI- RADS IV	Suspicious vs. malignant	30	25%
Discordant BI- RADS IV	Suspicious vs. benign	75	62.5%
Concordant BI- RADS V	Malignant vs. malignant	66	82.5%
Discordant BI- RADS V	Malignant vs. benign	4	5%
Borderline BI- RADS IV or V	BI-RADS IV or V vs. high risk outcome	25	12.5%

Table – 4: Comparison with other study.

Category	**FNAC**	**Current study**	**Mustafa, et al. [10]**
BI-RADS IV	Benign	62.5%	68.35%
	Malignant	25%	18.99%
	Borderline	12.5%	11.89%
BI-RADS V	Benign	5%	7.41%
	Malignant	82.5%	85.18%
	Borderline	12.5%	10.11%

Figure – 1: Malignant lesions.



In a total number of 120 patients with BI-RADS IV, 75 cases are of benign pathology, 30 are malignant on FNAC. Concordant malignancy found to be 25 % (n=30), discordant benign lesions are 62.5% (n=75) and borderline cases with high risk of malignancy are 12.5%.

In a total number of 80 cases with BI-RADS 5, majority i.e., 66 Cases found to be malignant and 4 cases are of benign pathology. A high percentage of cases 82.5% (n=66) have shown concordant malignancy whereas discordant benign cases found to be only 5% (n=4) and remaining 12.5% (n=10) of cases are borderline cases.

Figure - 2: BI-RADS I normal breast tissue with almost entire fat.

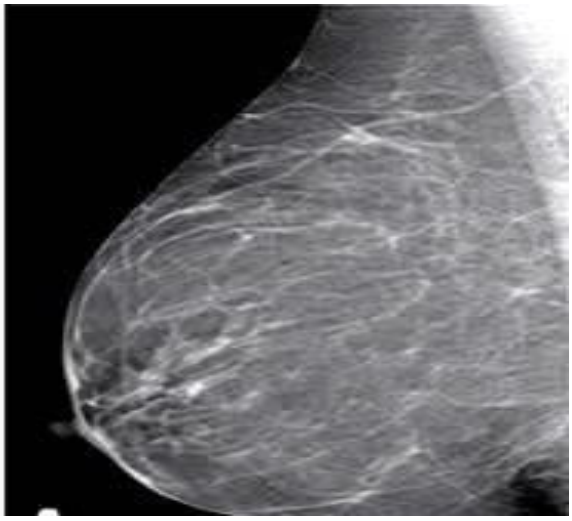


Figure - 3: BI-RADS II Fibroadenoma Focal fibroglandular densities.

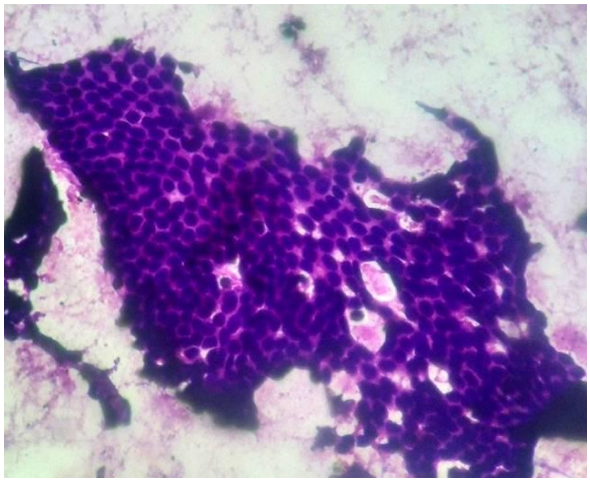
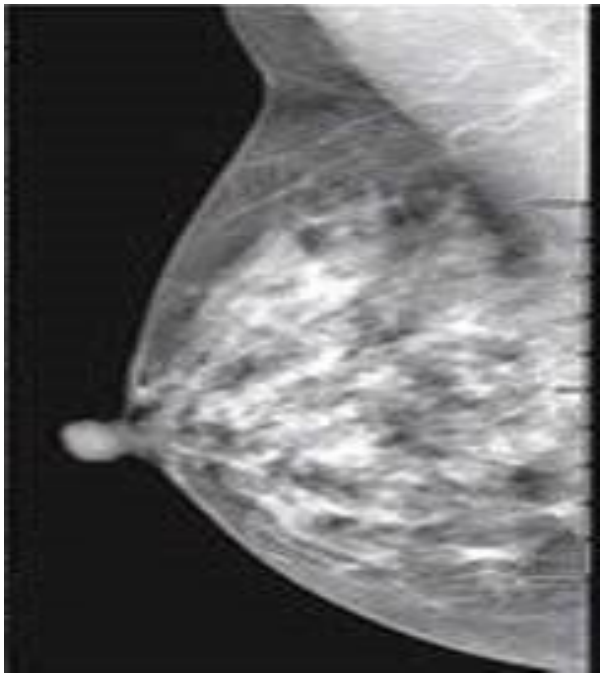


Figure - 4: BI-RADS III heterogenously dense – Firbocystic disease.



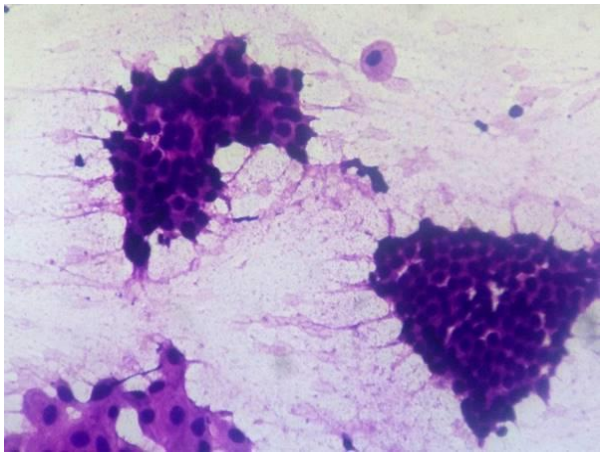


Figure - 5: BI-RADS IV extremely dense – Fibrocystic disease.

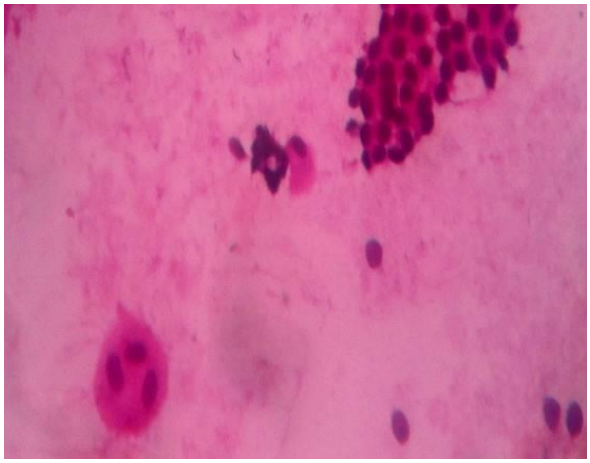
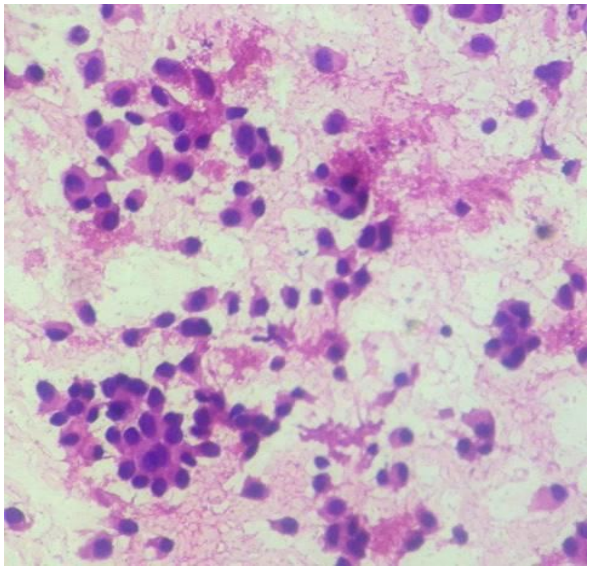


Figure - 6: BI-RADS V showing clusters of opacities with irregular contours – Duct cell carcinoma.



Discussion

Wide spread use of mammography has radically changed the diagnostic approach to breast cancer. Even small tumors of 1-2 mm size also can be detected by mammography. Diagnosis principally depends on calcification. Calcifications are positive in 50 -60% of carcinomas breast cases and 20% of benign lesions. Negative mammography however, does not rule out the probability of carcinoma, since approximately 20% of palpable tumors are not detectable with this technique [8].

In order to reduce the inter -observer variability and standardize the imaging reporting and risk assessment, BI-RADS lexicon was introduced by American college of Radiologists (ACR) in 1993, for mammography imaging of breast. Since then more editions were created in 1995, 1998 and 2003 [4, 9]. Latest update of BI-RADS was done in November 2015. In 2003, 4th edition of BI-RADS lexicon was expanded and applied to ultrasonography and MRI found breast lesions also [9]. According to the degree of malignancy suspicion, breast lesions were categorized in to 7 divisions. Category 0 (needs further evaluation), category I (Normal), Category 2 (Benign), Category 3 (Probably Benign), category 4(suspicious), Category 5 (Malignant) and category 6 (Known malignancy) [3, 4]. Category I and 2 are proved benign lesions on pathology. Category 3 lesions are judged to have less than 2% malignancy risk according to ACR guide lines [3]. In category 2 and 3 together, in our study 98.9% lesions have shown concordant benign pathology, which is in agreement with ACR recommendation of 98.2% concordant benign lesions (**Table - 2, Figures - 2, 3, 4**).

In general, the probability of malignancy in BI-RADS IV range from 2% to 95% which is highly variable [5]. But Lazarus, et al. found that positive predictive value (PPV) of category 4a (6%), 4b (15%) and 4c (53%) [10]. In our study out of 120 BI-RADS 4, cases benign are 75, malignant are 30 cases and

borderline were 15 (**Table - 1**). In the category 4 lesions concordant malignancy (suspicious Vs Malignant) which are highly suspicious of malignancy on imaging and found to be malignant on FNAC study are 25% (n=30) which is higher to Mustafa et al (18.9%) (**Tables – 3, 4, Figure - 5**). Discordant benign lesions (suspicious Vs benign) which are suspicious of malignancy on imaging but revealed a benign pathology are 62.5% (n=75) and borderline cases with high risk of malignancy 12.5%.This study is close to the study by Mustafa, et al. [10] (**Table - 4**).In a total 86 patients categorized as grade 5, 82.5% (n=66) are concordant malignant lesions while 5% (n=4) found to be discordant benign lesions (**Table - 3, Figure - 6**), this study which is also similar to Mustafa et al study (**Table - 4**). Following imaging, borderline (high risk) category indicates a lesion which are categorized under BI-RADS 4 and 5 grades on ultrasound /mammography but pathological analysis revealed no definite malignancy, but has increased risk for development of malignancy [5, 10]. In our study, high risk borderline lesions in BI-RADS 4 and 5 categories are 12.5% in each category. There are no standardized management recommendations presently available for these high risk groups but a multidisciplinary team is necessary for optimal management of cases like atypical ductal hyperplasia in this group. Surgical biopsy can be recommended regardless of concordance, because of a high rate of upgrade to malignancy in this category [5, 10].

Conclusion

FNAC is an established important preoperative diagnostic modality for carcinoma breast. BI-RADS grading by ACR is being widely used in diagnosing breast lesions. Our study revealed combination of these two modalities are synergistic resulting in greater specificity and sensitivity in diagnosing breast lesions especially high risk categories of grade 4 and 5. This suggests that a careful imaging and pathological correlation is a useful approach to establish an important and accurate preoperative diagnosis, as well as for planning therapeutic protocol in carcinoma breast cases.

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