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Original Research Article

Comparison of Histopathologic Findings with BIRADS Score in Trucut Biopsies of Breast Lesions

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Abstract

Background: Breast cancer is the commonest cancer among women in urban India. Triple assessment includes clinical, radiological and cytological assessment of breast lesions. Guided core needle biopsy has replaced fine needle aspiration cytology in most of the western countries. *Aim of the study:* The aim of the study is to analyze the concordance of histopathological and radiological findings in BIRADS categories 2, 3, 4 and 5 lesions following core biopsy. *Materials and Methods:* This was a prospective study done over a period of two years from June 2017 to June 2019. A total of 100 patients with breast lumps who underwent mammographic evaluation were selected for ultrasound guided trucut biopsies which were performed by a single radiologist. Only BIRADS categories 2, 3, 4 and 5 lesions were selected for trucut biopsies. The histopathological diagnosis was correlated with the BIRADS scoring. *Results:* Most of the women with breast lump were in the fifth decade. Out of 100 patients who underwent core needle biopsy, the positive predictive value for BIRADS 5 lesions for malignancy was 100%, the positive predictive value for BIRADS 4 lesions was 49% and the negative predictive value for BIRADS 2 and 3 lesions for malignancy was 87.5%. *Conclusion:* Core biopsy is a reliable method to diagnose breast lesions and has high accuracy compared to mammographic categorization using BIRADS score. The present study confirms high positive and negative predictive value for malignancy in BIRADS 5 and BIRADS 3 lesions. The positive predictive value for BIRADS 4 lesions is less due to inclusion of wide spectrum of lesions and also as the subcategorization is subjective. Objective and clear subclassification rules are needed for BIRADS 4 category.

Keywords: Breast trucut biopsy; BIRADS scoring; Histopathology and BIRADS scoring comparison.

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Introduction

Breast cancer is the most common cancer in females in the world and one of the leading causes of death in women worldwide.[1] Breast cancers usually are epithelial tumors of ductal or lobular origin.[1] Most breast cancers present as palpable lumps, inflammatory lesions, nipple secretions or

mammographic abnormalities. Though radiology and cytology findings are reliable, biopsy of the lump is to be done for definitive diagnosis. Preoperative pathology diagnosis constitutes an essential part of the work up of breast lesions.[2] Combined diagnostic approach is followed comprising of clinical examination, radiology, FNAC and biopsy in suspected cases of breast cancers which improves the diagnostic efficiency of breast cancers and reduce morbidity and mortality. BIRADS stands for 'Breast Imaging Reporting And Data System'. It includes seven categories and certain recommendations are given for each category. It also provides information on the recommended follow up and the likelihood of cancer (Table 1).

Table 1: BIRADS classification system[3]

BIRADS category	Assessment	Recommendations
0	Assessment incomplete	Need to review prior studies and/or complete additional imaging
1	Normal	Continue routine screening
2	Benign finding	Continue routine screening
3	Probably benign finding	Short-term follow-up mammogram at 6 months, then every 6 to 12 months for 1 to 2 years
4	Suspicious abnormality	Perform biopsy, preferably, needle biopsy
5	Highly suspicious of malignancy	Biopsy and treatment as necessary
6	Known biopsy proven malignancy, treatment pending	Biopsy confirms cancer before treatment begins

Aim of the study

The aim of the study was to analyze the concordance of histopathological and radiological findings in BI-RADS categories 2, 3, 4 and 5 lesions following core biopsy.

Materials and Methods

This was a prospective study conducted over a period of two years from June 2017 to June 2019 in department of Pathology at Kamineni Academy of Medical Sciences and Research Centre, L.B. Nagar, Hyderabad.

Inclusion criteria

1. Women with breast lump(s) willing to undergo mammogram and trucut biopsy of the breast lesion.
2. Only BIRADS categories 2, 3, 4 and 5 lesions were included.

Exclusion criteria

1. Women in whom only mammogram was done and who were not willing for trucut biopsy.
2. Cases with inadequate biopsy material were excluded.
3. Cases where only trucut biopsy was done without preceding mammogram.
4. Cases in which mammogram and trucut biopsy were done at other hospitals and modified radical mastectomy was done in our hospital were excluded.

Patient flow: Patients with breast lump who came to General Surgery OPD or Oncology OPD were examined and referred to department of Radiodiagnosis for mammographic evaluation. A few patients came from outside hospitals directly for mammogram. After mammogram, the radiologist performed trucut biopsy under ultrasound guidance for all the patients and the tissue specimens were submitted to department of Pathology.

Data was collected from 100 patients who underwent ultrasound guided interventional procedures. The patient age ranged from 26 to 88 years. Clinical evaluation included the patients' demographic details, reproductive history, family history of breast diseases, and physical examination.

Ultrasound examination of the breast masses was done by an expert Radiologist/Sonologist in the department of Radiodiagnosis. The transducer was gently applied and both longitudinal and transverse scans were taken. The scans included information regarding the four features of the breast: 1. Shape: round/oval or irregular; 2. Margins: circumscribed or noncircumscribed; 3. Width: AP ratio > 1.4 or 1.4; and 4. Echogenecity: Hyperechoic, isoechoic or hypoechoic. On the basis of these four features an impression about the diagnosis was made. The studies were reviewed and reported according to BIRADS protocol. Written consent was taken from the patient for the Core biopsy procedure and it was performed under ultrasound guidance by the radiologist. Core biopsy was performed using a 16 G automated biopsy gun under local anesthesia with 2% plain lignocaine. Two to three cores were taken and fixed in buffered formalin and all were processed. Sections were taken and stained by Hematoxylin and Eosin staining. Although immunohistochemistry study for estrogen and

progesterone receptors, Her 2/neu and Ki 67 were done on a few trucut biopsies, the results were not considered for this study.

Sections were read by two pathologists from a single institution. In case of any minor discordant opinion between the two pathologists, the opinion of the senior pathologist was considered final.

Results

Table 1 shows the age distribution of the 100 cases. The most common age group involved was women in fifth decade. Radiological distribution of the lesions in the present study is shown in Figure 1.

There were two women of BIRADS 2 lesions for which a trucut biopsy is not recommended and only continued screening is sufficient. But due to anxiety and insistence of the patients, a trucut biospy was done in these two cases.

Among the 100 cases, 55 (55%) cases were categorized as BIRADS 4, 37 (37%) cases were BIRADS 5, 6 (6%) cases as BIRADS 3 and 2 (2%) cases were of BIRADS 2. Histopathological distribution of lesions in the present study is shown in Figure 2. Among 55 cases of BIRADS 4 lesions, 24 cases were reported as invasive ductal carcinoma, NST (no special type) type, 7 cases as usual epithelial hyperplasia, 6 cases as fibroadenoma, 6 cases as fibrocystic disease of breast, 4 cases as inflammation, 3 cases as DCIS high grade, 3 cases as fibroadenosis, 1 case as phyllodes and 1 case as no evidence of malignancy on histopathology. All the 37 cases of BIRADS 5 lesions were reported as invasive ductal carcinoma on histopathology. Out of 6 cases of BIRADS 3 lesions, 4 cases were reported as fibroadenoma, 1 case as periductal inflammation and 1 as fibrocystic disease of breast on histopathology. Among 2 cases of BIRADS 2 lesions, 1 was reported as fibroadenoma and 1 was reported as papillary carcinoma breast on histopathology. Majority of the lesions in the present study that is 61 cases (61%) out of 100 cases were invasive ductal carcinoma. Microscopic pictures of the common lesions involved in the present study are shown in Figures 3 to 8.

Table 2: Agewise distribution of the cases

Age (in years)	No. of cases	Percent (%)
21–30	4	4%
31–40	18	18%
41–50	44	44%
51–60	12	12%
61–70	16	16%
71–80	4	4%
81–90	2	2%
Total	100	100%

Most of the cases (44%) were in the fifth decade. (Table 2).

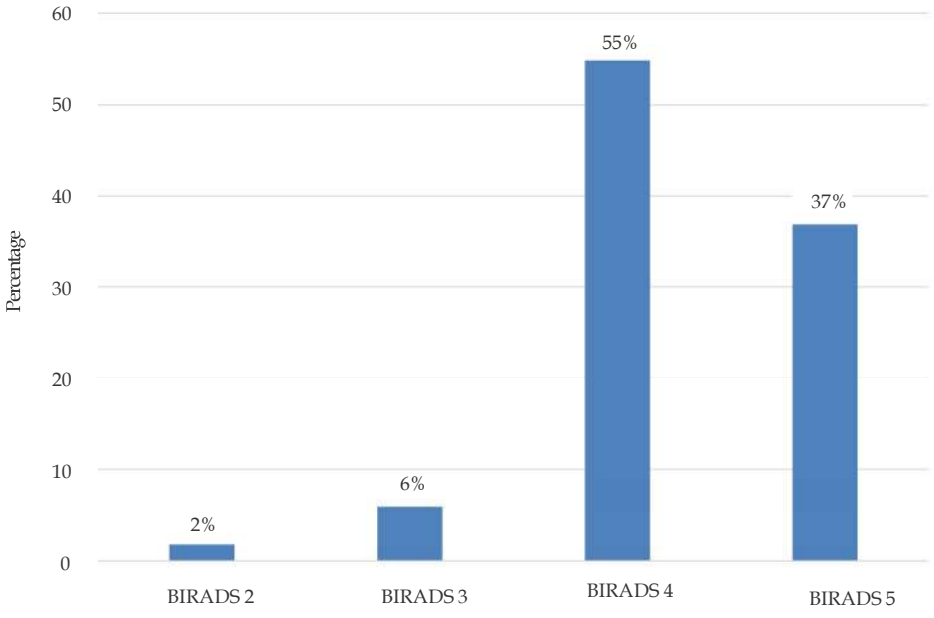

Fig. 1: Radiological distribution of results based on BIRADS score.

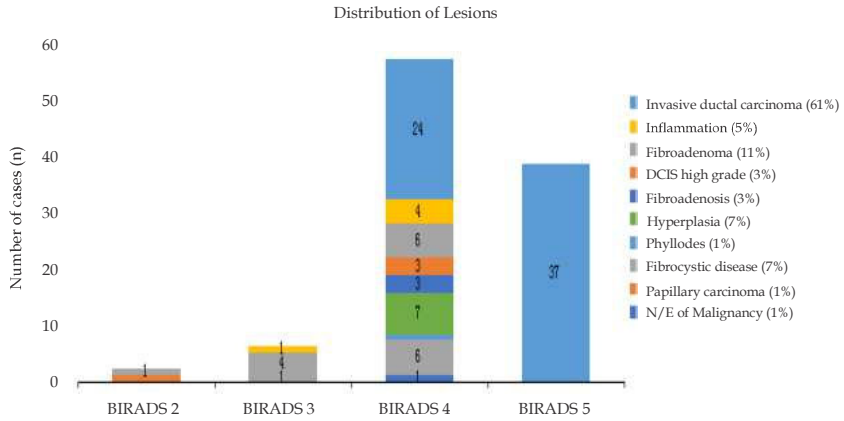

Fig. 2: Histopathological distribution of lesions and BIRADS score.

Table 3: Histopathological diagnosis on trucut biopsies

Histopathology	No. of cases	Percent (%)
Invasive ductal carcinoma (NST)	61	61%
Papillary carcinoma	1	1%
DCIS	3	3%
Fibrocystic changes	7	7%
Epithelial hyperplasia	7	7%
Fibroadenoma	11	11%
Fibroadenosis	3	3%
Inflammation	5	5%
Phyllodes tumor	1	1%
No evidence of malignancy/ Hyalinised tissue	1	1%
Total	100	100%

On histopathology, Invasive ductal carcinomas (NST) accounted for 61 (61%) cases of the breast lumps (Table 3).

Table 4: Sensitivity and specificity of BIRADS 2, 3 and 5 for malignancy

	Malignant lesions	Benign lesions
Positive cases	True positive - 37	False negative - 01
Negative cases	False positive - 0	True negative - 07

Sensitivity: TP/TP+FN X 100 = 97.5%

Specificity: TN/TN+FP X 100 = 100%

Diagnostic accuracy: TP+TN/TP+TN+FP+FN = 97.7%

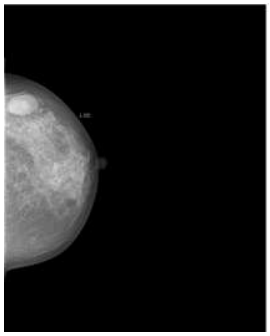

Fig. 3: Mammogram shows a well-defined hyperdense lesion in left upper outer breast. The lesion corresponds to an irregular horizontal oriented heterogenous lesion in left 3 o'clock position with increased vascularity and posterior enhancement: BIRADS 4 lesion.

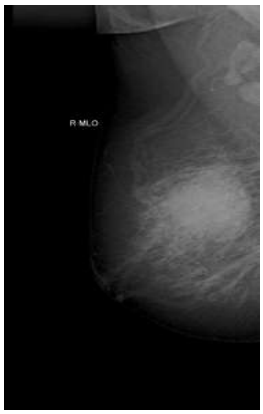

Fig. 4: Mammogram shows an irregular hyperdense lesion involving the right upper outer breast, BIRADS 5 lesion.

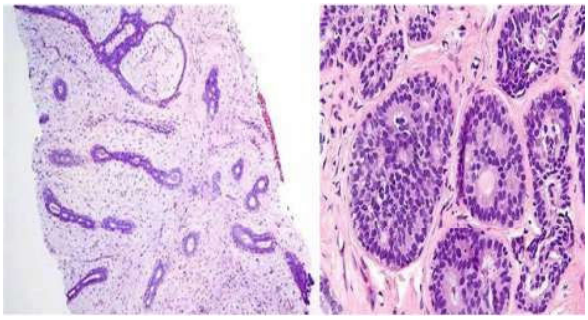

Fig. 5: Histopathology on trucut biopsy: Fibroadenoma, H&E 10X and ductal hyperplasia breast, H&E 40X.

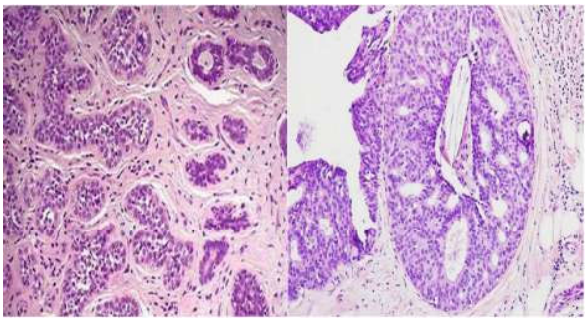

Fig. 6: Fibroadenosis, H&E 40X and ductal carcinoma in situ, H&E 40X.

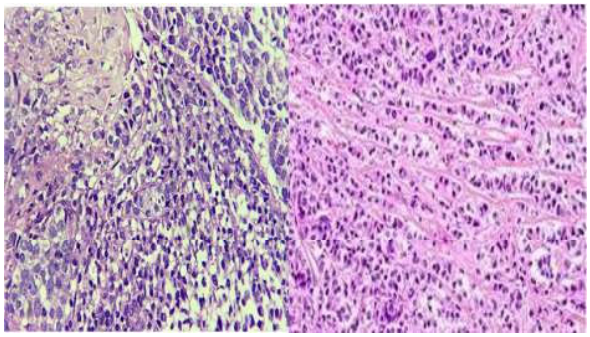

Fig. 7: Invasive ductal carcinoma (NST) H&E 40X and Invasive lobular carcinoma, H&E, 40X.

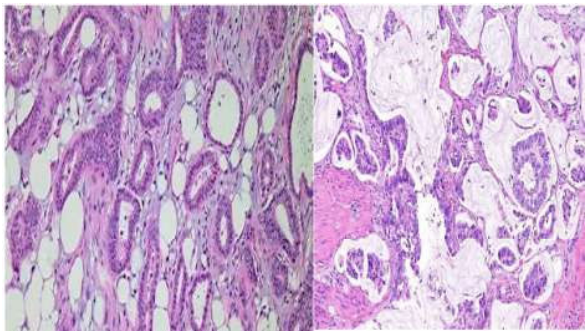

Fig. 8: Tubular carcinoma breast, H&E 40X and Mucinous carcinoma breast, H&E 40X.

Discussion

Breast diseases are common in females. In developing countries like India, females are unaware of breast pathologies and are also hesitant to reveal any breast lumps, hence, they are often detected in advanced stages. Various benign breast lesions like fibroadenomas, breast abscess, galactocele, duct ectasia, enlarged lymph nodes and different malignancies are common pathologies of female breast.[4] Patients with palpable breast lesions commonly present for radiology evaluation. Mammography is an important method for detection and diagnosis of breast disease with sensitivity of 85%–95%. The BIRADS lexicon was first developed in 1993 for reporting mammography.[4] It is helpful to physicians in predicting the likelihood of cancer. Although mammography is recognized as the best method of screening for breast cancer, breast sonography is now well established as valuable imaging technique.[4] Trucut biopsy is performed in an out patient setting and can replace incisional biopsy done in operating room, being more practical and less costly. Another advantage of trucut biopsy is that a definitive diagnosis of invasive carcinoma can be given and the difficulty of differentiating atypical hyperplasia and carcinomas or low grade well-differentiated carcinomas seen in FNAC can be overcome.[4]

The most common age group involved in our study were females of fifth decade which is similar to the observations of Selvi Radhakrishna et al.[1] and Sarangan et al.[5] The most common benign lesion in our study was fibroadenoma which accounted for 11% of the total cases in the study. It is similar to the observations made by Sarangan et al.[5] In studies made by Selvi Radhakrishna[1] and Eda Elverci et al.[6] the most common benign lesion was fibrocystic disease of breast. The most common malignant lesion in our study was invasive ductal carcinoma (no special type) which accounted for 61% of the cases in the study. It is similar to the observations made by many other studies (Table 5).

Out of 37 cases of BIRADS 5 lesions which were considered as malignant on radiology, all the 37 cases proved to be malignant on core biopsy. So the positive predictive value for BIRADS 5 lesions for malignancy was 100%. Usually the likelihood of malignancy for BIRADS 5 category lesions is >95%. In a study by Selvi Radhakrishna et al.[1] the positive predictive value (PPV) for BIRADS 5 lesions was 93.25%. In another study by Kim MJ et al.[7] the PPV for BIRADS 5 lesions was greater than 95%.

Out of 55 cases of BIRADS 4 lesions which were considered as suspicious of malignancy on radiology, 21 cases were proved to be benign and 24 cases were proved to be malignant on core biopsy. Usually the likelihood of malignancy for BIRADS 4 category lesions is 2% to 95%.

The positive predictive value for BIRADS 4 lesions in our study, for malignancy was 49%. This can be attributed to subcategorizing the BIRADS 4 lesions into 4A, 4B and 4C, which includes wide spectrum of lesions including inflammatory lesions, breast abscesses, hyperplasias, etc. There are no definitive diagnostic criteria established for subcategorization and it is solely based on Radiologist/Physician's level of suspicion of malignancy. Eda Elverci et al.[6] in their study reported the PPV for BIRADS 4 lesions as 38.7%. In another study by Sarangan et al.[5] the PPV for BIRADS 4 lesions was 56.25%. The PPV of BIRADS 4 lesions can be higher if 4A lesions are excluded and only 4B and 4C are considered for correlation with histopathology.

In our study, out of 8 cases of BIRADS 2 and 3 which were considered as benign and probably benign on radiology respectively, 7 were benign and one was malignant lesion on core biopsy. The negative predictive value for BIRADS 2 and 3 lesions for malignancy was 87.5%. Percentage of benign and probably benign which proved to

Table 5: Comparison of present study with other studies

Study	No. of cases	Age group	Most common benign lesion	Most common malignant lesion
Selvi Radha Krishna et al.[1]	437	Fifth decade	Fibrocystic change	Invasive ductal carcinoma (NOS)
Sarangan et al.[5]	106	Fifth and sixth decades	Fibroadenoma	Invasive ductal carcinoma (NOS)
Eda Elverci et al.[6]	186	Fourth decade	Fibrocystic change	Invasive ductal carcinoma (NOS)
Kim MJ et al.[7]	71	Fifth decade	Fibroadenoma	Invasive ductal carcinoma (NOS)
Arsalan et al.[3]	50	Fifth decade	Ductal hyperplasia	Invasive ductal carcinoma (NOS)
Present study	100	Fifth decade	Fibroadenoma	Invasive ductal carcinoma (NOS)

Table 6: Comparison of present study with other studies

Study	PPV for BIRADS 5	PPV for BIRADS 4	NPV for BIRADS 3	Sensitivity of BIRADS	Specificity of BIRADS	Diagnostic accuracy of BIRADS
Selvi Radha Krishna et al.[1]	93%	70%	98.5%	93%	98.5%	76%
Sarangan et al.[5]	95%	56.2%	82.9%	100%	82.92%	75.43%
Eda Elverci et al.[6]	100%	38.7%	97%	100%	97%	65%
Kim MJ et al.[7]	100%	58%	87.5%	100%	87.5%	85%
Arsalan et al.[3]	100%	33.3	82.5%	100%	100%	88.8%
Present study	100%	49%	87.5%	97.3%	100%	97.7%

be malignant on core biopsy was 12.5%. Sarangan et al.[5] in their study reported the NPV for BIRADS 3 as 82.92% which is close to our study. Sensitivity and specificity of BIRADS 2, 3 and 5 for malignancy is shown in Table 4.

Sensitivity, specificity and diagnostic accuracy of BIRADS 2, 3 and 5 for malignancy was 97.5%, 100% and 97.7% respectively. Sarangan et al.[5] in their study reported sensitivity of BIRADS for benign lesions as 93.5%. Specificity of BIRADS for malignancy was 100% in our study which correlates with other studies. Diagnostic Accuracy of BIRADS in our study was 97.7% (Table 6).

Since its establishment several studies have found that BI-RADS lexicon can be helpful to physicians in predicting the likelihood of breast cancer.[8,9] It is important to be aware about the other non-breast lesions which can present with palpable breast mass like chest wall lesions, muscular and pleural lesions.[10] Many inflammatory breast lesions create confusion as they present as palpable mass like duct ectasia, and fat necrosis.[11] A significant number of patients with breast carcinoma may be missed by diagnostic mammogram especially in young patients with dense breast tissue.[12] In young women and women with dense breasts, ultrasound appears superior to mammography.[13] Ultrasound is also helpful in guiding FNAC or biopsies and more reliable in evaluation of dense breast tissue.[14,15] Some false negative cases are inevitable with FNAC.[16] Sampling errors and interpretation errors are responsible for false negative results.[17] Inflammatory breast disease and non-proliferative breast disease do not increase the risk of cancer.[18] Most malignant breast lesions have been detected in 30–50 years age group in western region of Nepal which correlates with our study.[19] Open biopsy of mammary lesions has greater discomfort and pain, higher rate of wound healing complication as well as prolonged recovery and higher cost and hence, trucut biopsy is preferred.[20]

Conclusion

Core biopsy is a reliable method to diagnose breast lesions and has high accuracy compared to mammographic categorization using BIRADS score. The present study confirms high positive and negative predictive value for malignancy in BIRADS 5 and BIRADS 3 lesions. The positive predictive value for BIRADS 4 lesions is less due to inclusion of wide spectrum of lesions and also as the subcategorization is subjective. Objective and clear subclassification rules are needed for BIRADS 4 category.

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