Comparison of Breast Biopsy Pathology Reporting with Breast Imaging Reporting and Data System (Bi-Rads) Categories-An Institutional Study

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ABSTRACT

Objective: To determine concordance and discordance between radiological and pathological findings of palpable breast lesions.

Study Design: Comparative cross-sectional study.

Place and Duration of Study: Department of Histopathology, Armed Forces Institute of Pathology, Rawalpindi Pakistan, from Oct 2018 to Mar 2019.

Methodology: Imaging and histopathologic reports of a total of 170 female patients with breast lumps were analyzed. Concordance and discordance rates were estimated by comparing histopathology and imaging findings. All the reports were divided into four categories. Malignant concordant lesions showed malignant features and benign concordant lesions showed benign features on both imaging and histopathology. Malignant discordant lesions were those lesions, which were reported benign on imaging but proved to be malignant on histopathology and benign discordant lesions were those showing malignant features on imaging but turned out to be benign on histopathology.

Results: Overall concordance was observed in 138 (81.2%) cases with a discordance rate of 18.8% (15.3% benign discordant and 3.5% malignant discordant). All malignant discordant cases (n=6, 3.5%) were reported as Breast Imaging Reporting and Data System category III on imaging and all came out to be invasive ductal carcinoma on histopathology. All benign discordant cases (n=26, 15.3%) were reported as Breast Imaging Reporting and Data System category IV on imaging.

Conclusion: A higher discordance rate between imaging and histopathologic findings was observed in the present study as compared to what cited in the literature. Discordant cases should be followed by repeat biopsy for confirmation of diagnosis

Keywords: Breast cancer, Breast imaging reporting and data system, Concordance.

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INTRODUCTION

Pakistan is considered to have the highest incidence of breast cancer among Asian countries.[1] Late stage and younger age at presentation is a frequently observed phenomenon.[2,3] Mammography and Ultrasonography are useful diagnostic tools for initial evaluation of palpable breast lumps.[4] Breast Imaging Reporting and Data System (BIRADS) is routinely used by the radiologists for categorization and classification of abnormalities observed on imaging. Adoption of same system also ensures the standardization of reporting of imaging studies.[5] Suspicious mammographic findings require an obligatory biopsy procedure to confirm the diagnosis. Not only the malignant lesions pose a major public health problem but also the benign lesions can contribute to the morbidity and worries of the patients and their families.[6,7] Core needle biopsy (CNB) is more accurate than fine needle aspiration cytology (FNAC) for obtaining the specimen for histopathologic analysis.[8] However, if CNB fails to sample a cancer adequately, it will result in nonspecific or benign pathologic diagnosis, no matter how much the technique is optimized.[9] Image guided biopsy is considered in breast lesions, which are suspicious for malignancy (BIRADS IV) or lesions highly suggestive of malignancy (BIRADS V).[10] Correlation between radiological and pathological findings should be assessed for each case to ensure that findings on imaging are adequately explained on pathologic investigation.[11]

Present study was planned to determine the level of agreement between imaging and histological findings of breast lesions in our setup. The results of present study would help in appraisement of our lesions reporting system and to identify the factors resulting in discordant results. Our main objective was to determine the extent and causes of concordance and discordance between radiological and pathological findings of palpable breast lumps. The rationale of this study was to identify the factors resulting in the dis-

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cordant radiological and pathological findings as we come across number of such discordant findings in our routine clinical practice.

METHODOLOGY

It was a comparative cross-sectional study conducted at the Armed Forces Institute of Pathology, Rawalpindi, from October 2018 to March 2019 after obtaining approval from the Institutional Review Board and ethical committee (FC-HSP-18-6/READ-IRB/19/440, Dated: 12-07-2019). A total of one hundred and seventy (n=170) female patients (sample size was calculated by taking confidence level of 95%, with margin of error 5%, anticipated discordant rate of 1.8%[12] and absolute precision of 2%) between age 16-70 years with palpable breast lumps who underwent mammography and referred for the biopsy to department of histopathology AFIP, Rawalpindi of were enrolled the through consecutive non-probability sampling. A well informed written consent was obtained from every participant of the study. All those women who had incomplete medical record and were not willing to participate in the study were excluded. Trucut biopsy was performed for all the patients by experienced surgeon/interventional radiologist. The quantity and quality of the material obtained was assessed after immediate immersion of the specimen in fixative, and then specimen were sent to histopathology department. BI-RADS categorization was done by the experienced radiologists of the institute. For the purpose of homogeneity a uniform system was adopted for categorization of imaging and biopsy findings (Table-I).

Table-I: Reporting categories on imaging and core biopsy.

Imaging Category	Description	Biopsy Category	Description
BIRADS-I	Negative	B-I	Normal Tissue
BIRADS-II	Benigen	B-II	Benigen Lession
BIRADS-III	Probably Benigen	B-III	Lession of Uncertain Malignant Potential
BIRADS-IV	Suspicious Abnormally	B-III	Suspicious for Malignancy
BIRADS-V	Highly Suspicious for Malignancy	B-IV	Malignant

Concordance and discordance rates were estimated by comparing histopathology and imaging findings. All the reports were divided into four categories. Malignant Concor-dant were the lesions, which showed malignant fea-tures on imaging (BI-RADS category IV/V) and were confirmed as malignant on histopathology (B-V). Benign Concordant were the lesions, which showed benign features on imaging (BI-RADS category II/III) and proved to be benign on histopathology (B-II). Malignant discordant were the lesions, which were benign on imaging (i.e., BI-RADS category II/III) but proved to be malignant on histopathology (B-V) and benign discordant were the lesions, which were suspicious for malignancy at imaging (BI-RADS category IV/V), but came out to be benign on histopathology (B -II).[12-15] All the data were entered and analyzed on computer software Statistical Package for the Social Sciences (SPSS) version 20 for further analysis. Mean and SD was calculated for quantitative data while frequency and percentages were calculated for qualitative data. The kappa (κ) statistic were estimated to measure the degree of agreement between imaging and histopathological findings. Kappa values were regarded as highlighting slight agreement (κ ≤0.2), fair agreement (κ=0.21–0.4), moderate agreement (κ=0.41–0.6), substantial agreement (κ=0.61–0.8) and almost perfect agreement (κ >0.8). The agreement was considered significant if *p*-value was ≤0.05. SPSS version 21 was used to analyze and interpret the data.

RESULTS

Imaging and hito-pathologic reports of a total of 170 female ptients with breast lumps were analyzed. Mean age of the study particpants was 44.9 ± 14.3years. A total of 88 (52%) females presented with left and 88 (48%) presneted with right sided breast lesion. The agreement (concordance rate) between the imaging and histopathological findings was observed in 132 (81.2%) cases, which was moderate (κ=0.60) but statistically significant (*p*=0.041, Table-II).

Table-II: Agreement between imaging and histopathological findings.

Imaging Findings	Histopathology Findings		Total	k-value	*p*-value
	Benign	Malignant			
Benign	46	6	52	0.60	0.041
Malignant	26	92	118		
Total	72	98	170		
Overall concordance rate between two imaging and histopathological findings.				138 (81.2%)	

A discordance was observed in 32 (18.8%) cases with 26 (15.3%) showed discordance in benign and 6 (3.5%) showed discordance in malignant lesions

(Table-III). All malignant discordant cases 6 (3.5%) were reported as BIRAD category III (probably benign with risk of malignancy <2%) on imaging and all came out to be invasive ductal carcinoma on histopathology. All benign discordant cases (n=26, 15.3%) were reported as BIRAD category IV on imaging (suspicious for malignancy). On histopathology most common finding in this category was fibroadenoma (n=8) followed by inflammatory lesions (n=6). Details of benign discordant lesions are presented in Figure-1.

Table-III: Comparison between imaging and histopathologic findings.

Concordance/Discordance	n (%)
Concordance in Malignant Lesions	92 (54.1)
Concordance in Benign Lesions	46 (27.1)
Discordance in Benign Lesions	26 (15.3)
Discordance in Malignant Lesions	6 (3.5)
Total	170 (100)

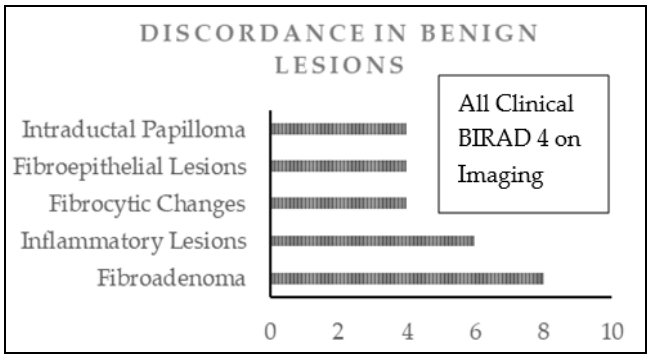

Figure: Detail of discordance in benign lesions (n=26).

DISCUSSION

Percutaneous breast biopsy is considered as the foundation of diagnosing breast pathology. In majority of breast lesions biopsy is performed under ultrasonography guidance.[16,17] Nonetheless, for the successful breast biopsy under imaging guidance, an optimum technique of biopsy is required along with determination of concordance between imaging and pathology findings and an appropriate strategy for managing patients after biopsy in case of discordant results. Our results showed overall concordance rate of in 81.2% cases while a discordance was observed in 18.8% (15.3% discordance in benign and 3.5% discordance in malignant lesions). Several studies have reported a discordance rate of 2-19% among imaging and histopathological findings (Table-IV).[13,18,19]

In the present study, on histopathology most common finding in this category was fibroadenoma (n=8) followed by inflammatory lesions (n=6) and all the benign discordant cases (n=26, 15.3%) were reported as BIRAD category IV on imaging (suspicious for malignancy). Other studies showed that the benign lesions, which mimic malignancy on imaging are the ones with spiculations. These include inflammatory lesions, fibroadenomas, postsurgical scars, sarcoidosis and sclerosingadenosis.[20,21] If there is concern regarding a discordant benign lesion, the pathologist interpreting the results and the radiologist should communicate with each other and discuss about the discrepancy. The referring physician should be taken on board and patient should also be explained. A repeat biopsy may be considered based on these discussions.

Table-IV: Imaging-pathology discordance reported in literature.

Author	Place	Year	Number of Masses Evaluated	Discordance Rate
Kim MJ	South Korea	2007	837	3.9%
Mihalik JE	USA	2010	1264	2.0%
Youk JH	South Korea	2010	3724	2.5%
Li JL	China	2010	1069	2.6%
Son EJ	South Korea	2011	1588	6.5%
Wang ZL	China	2011	1532	4.1%
Sohn YM	South Korea	2014	7470	2.2%
Romanoff AM	USA	2014	430	17%
Soyder A	Turkey	2015	961	5.8%
Humayun *et al*	Pakistan	2019	170	18.8%

In the present study, all malignant discordant cases 6 (3.5%) were reported as BIRAD category III (probably benign with risk of malignancy <2%) on imaging. The radiology department was approached to seek the possible explanation of these discordant lesions. All of the malignant discordant lesions appeared well circumscribed on radiological imaging and hence reported as benign. There are several malignant breast lesions, which manifest themselves as well circumscribed lesions. These include invasive ductal carcinomas (especially the ones that are triple negative or that are labeled as high nuclear grade), lymphomas and some other special type of carcinomas (mucinous, papillary, medullary). In the present study, all the malignant discordant lesions came out to be invasive ductal carcinoma on histopathology. An identical management as that for concordant malignant lesions is generally

recommended for these lesions. The radiologist should also thoroughly review the images for quality of images and imaging characteristics and ensure that there are no missed features, which account for underestimation in these cases. We suggest these practices need to be followed on routine basis in our department.

The major reasons of discordant results between imaging and histopathology findings are inadequate targeting of the lesion and inadequate sampling. Although image guided biopsy has advantages over stereotactic biopsy for appropriate localization and targeting of the lesions yet there are very limited methods, which can confirm inadequate targeting of the lesions. Mammography specimens do not serve the purpose for confirming adequate targeting and evaluation of the needle in real time is imperative. Moreover, the radiologist must also be aware of any technical difficulties beforehand, which may result in errors while targeting, like in cases of deep lesions, dense tissue and mobile lesions.[23,24] Inadequate sampling error is another possible cause of such discordant results. Schueller *et al,* in their study evaluated more than 1300 cases of ultrasound guided CNB. They demonstrated that the areas, which were most suspicious in the lesions, were missed by the needle in most of the discordant cases.[25] Other studies have demonstrated that for a reliable histopathological diagnosis, the optimum number of specimens and their quality should also be considered. A minimum of 4-5 cores are essential in order to obtain a definite diagnosis, preferably under image guidance and even more samples are required in lesions with calcifications.

Other aspect that needs to be considered and addressed while establishing the final concordance between imaging and pathology results is whether the histologic results are providing an acceptable explanation for the imaging findings. Cases with discordant pathology and imaging diagnoses can be categorized as discordant, even if both imply a benign disease. In these cases, larger tissue sampling using ultrasound guided vacuum assisted breast biopsy (VABB) may be considered or short-interval imaging follow-up may also be considered. For example, benign and non specific biopsy results may be considered discordant if obtained from a discrete solid mass, even if the lesion was initially considered as benign (BI-RADS category 2, 3, or 4a). On the other hand, benign nonspecific results, such as fibrocystic change, may be considered concordant if biopsied from a cystic lesion or focal dilated duct.

In summary, discordance between imaging studies and biopsy findings may be observed. Both the radiologists and interpreting pathologists should be aware of the possibility of these discordant results and be familiar with not only the biopsy technique, but how to determine imaging-pathology concordance. They should also know as what to plan next in these cases. Generally, discordant malignant lesions are treated as identical to concordant malignant lesions and repeat biopsy is recommended for discordant benign lesions. The best biopsy method should be selected for each case after communication/discussion between the radiologist, pathologist, referring physician and the patient.

CONCLUSION

A higher discordance rate between imaging and histopathologic findings was observed in the present study as compared to what cited in the literature. Discordant cases should be followed by repeat biopsy for confirmation of diagnosis. As the degree of suspicion is variable while diagnosing a breast lesion, triple assessment is suggested for an accurate diagnosis of all palpable breast lumps. The combination of clinical examination, radiological imaging and pathology may give the highest accuracy.

Conflict of Interest: None.

Authors' Contribution

SH: Data collection, writing, MA; Initial idea, proof reading, MTK: Proof reading, HUD: FR: Data contribution, FA: Helped in data collection.

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