

RADIOLOGICAL AND HISTOLOGICAL CORRELATION OF NON-PALPABLE BREAST LESIONS IN PATIENTS SUBMITTED TO PREOPERATIVE MARKING ACCORDING TO BI-RADS CLASSIFICATION*

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Abstract **OBJECTIVE:** To evaluate the positive predictive value for BI-RADS (Breast Imaging Reporting and Data System) categories 3, 4 and 5, correlating mammographic and histological diagnosis in non-palpable breast lesions. **MATERIALS AND METHODS:** Analytical-descriptive study of 169 women submitted to stereotactic localization for surgical biopsy of non-palpable breast lesions. Mammographic and histological findings were correlated, analyzing the predictive positive value for each category. **RESULTS:** Forty-two (24.8%) cases were diagnosed with breast cancer — only one in category 3, 19 in category 4, and 22 in category 5. The positive predictive value for categories 3, 4A, 4B, 4C and 5 were, respectively, 3.4%, 10.3%, 11.3%, 36% and 91.7%. Microcalcifications were the most frequent finding related to malignancy, present in 61.5% of these cases. **CONCLUSION:** The present study has demonstrated that BI-RADS allows a safe prediction of high suspicion of malignancy in lesions category 5 and low suspicion for category 3. As regards the category 4, the positive predictive value has shown a progressive increase in subcategories A, B and C, demonstrating that this subclassification represents an invaluable contribution for a more detailed and accurate assessment of lesions suspicious for malignancy.

Keywords: Breast cancer; Mammography; BI-RADS; Histological diagnosis.

Resumo *Correlação radiológica e histológica de lesões mamárias não-palpáveis em pacientes submetidas a marcação pré-cirúrgica, utilizando-se o sistema BI-RADS.*

OBJETIVO: Avaliar as categorias 3, 4 e 5 da classificação BI-RADS (Breast Imaging Reporting and Data System) como fator preditivo para malignidade, correlacionando os achados mamográficos e histológicos em lesões não-palpáveis da mama. **MATERIAIS E MÉTODOS:** Estudo analítico descritivo de 169 mulheres submetidas a biópsia cirúrgica, após localização estereotóxica de lesões mamárias não-palpáveis. As mamografias dessas pacientes foram classificadas de acordo com a quarta edição do BI-RADS, avaliando-se as categorias 3, 4 (A, B e C) e 5. Correlacionaram-se os achados mamográficos com os exames histológicos das lesões, avaliando-se o valor preditivo positivo em cada categoria. **RESULTADOS:** No total de 169 casos, foram diagnosticados 42 casos de câncer (24,8%). Destes, houve apenas um caso na categoria 3, 19 casos na categoria 4 e 22 casos na categoria 5. Os valores preditivos positivos para as categorias 3, 4A, 4B, 4C e 5 foram, respectivamente, de 3,4%, 10,3%, 11,3%, 36% e 91,7%. As microcalcificações foram o achado mais freqüente relacionado à doença maligna, ocorrendo em 61,5% do total. **CONCLUSÃO:** Este estudo demonstrou que a classificação BI-RADS permite prever com segurança que há alta suspeição de malignidade para achados classificados na categoria 5 e diminuta chance para os achados da categoria 3. Quanto à categoria 4, foi constatada elevação progressiva dos valores preditivos positivos nas subcategorias A, B e C, mostrando que esta subdivisão contribui de forma mais detalhada e precisa na indicação de lesões suspeitas para malignidade.

Unitermos: Câncer de mama; Mamografia; BI-RADS; Diagnóstico histológico.

INTRODUCTION

Mammography is the most specific and sensitive method for diagnosis of breast cancer at its earliest presentation⁽¹⁾. Annual mammographic screening in women above 40 years of age identifies 100 to 200 new cases of suspect lesions for each 20,000 mammograms presenting like non-palpable lesions and requiring histological study, the preoperative localization being one amongst the available options⁽²⁾. So, not-

withstanding the good performance of mammography in the identification of early stages of breast neoplasms, only 15% to 30% of non-palpable lesions submitted to surgical biopsy are malignant⁽³⁾. This has resulted in the elaboration of a proposal for classifying mammographic findings aiming at improving the performance of the method and reducing the frequency of biopsies with benign diagnosis⁽⁴⁾.

The American College of Radiology has developed the Breast Imaging Reporting

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and Data System (BI-RADS®) to standardize the terminology employed for mammographic reports elaboration and for recommendations to be adopted. The fourth BI-RADS edition, of November/2003, proposed seven categories for mammographic findings: negative for malignancy (1), benign (2), probably benign (3), suspect for malignancy (4), highly suspect for malignancy (5), with proved malignancy (6) and requiring additional evaluation (0). The category 4 was subdivided into A, B and C^(5,6).

The present study had the objective to evaluate the positive predictive value for BI-RADS (fourth edition) for categories 3, 4A, 4B, 4C and 5, correlating mammographic and histological diagnosis in non-palpable breast lesions, and verifying which are the findings of more relevance for breast cancer diagnosis in each category.

MATERIALS AND METHODS

Experienced radiologists performed mammographic analysis of 169 non-palpable breast lesions of patients submitted to biopsy in the period between September/2003 to April/2004. The findings were classified according to BI-RADS, and categories 3, 4A, 4B, 4C and 5 were evaluated. The mammograms evaluated in the present study were performed in a Mammomat 3000 Nova (Siemens) equipment, in craniocaudal and medial-lateral oblique views, besides supplementary views with magnification and focal compression. The patients were submitted to preoperative marking of lesions by means of stereotactic mammography in 90.53% (153) of cases, or ultrasound in 9.46% (16).

The breast tissue specimens obtained by surgical biopsies were processed for sections in paraffin blocks and hematoxylin-eosin staining, and the diagnoses were elaborated by pathologists specialized in breast pathology.

This was a descriptive-analytical type study to evaluate the agreement between the updated BI-RADS classification and the histological diagnoses in non-palpable breast lesions, by calculating the positive predictive value (PPV). Also, a correlation was made between the most relevant radio-

logical findings and malignant neoplasms for each category.

RESULTS

Amongst the patients included in the present study, 36.1% were less than 50 years old, 36.7% were 50–59 years old, and 27.2% were 60 or more years old.

Of the total 169 cases evaluated, the percentual distribution of mammographic diagnoses according to BI-RADS was the following: 17.2% (29) for category 3, 68.6% (116) for category 4, and 14.2% (24) for category 5. Focusing only on category 4, its subcategories had the following percentual distribution: 25% (29/116) for the subcategory A, 53% (62/116) for the subcategory B, and 22% (25/116) for subcategory C.

Forty-two (24.8%) cases were diagnosed with breast cancer — one in category 3, three in the category 4A, seven in category 4B, nine in category 4C, and 22 in category 5. Therefore, PPV were: 3.4% (1/29) for BI-RADS 3, 10.3% (3/29) for BI-RADS 4A, 11.3% (7/62) for BI-RADS 4B, 36% (9/25) for BI-RADS 4C and 91.7% (22/24) for BI-RADS 5 (Table 1).

Amongst lesions classified as BI-RADS 3 there was only one case of breast cancer, whose radiological finding was focal asymmetry. In the other categories, the mammographic findings most frequently associated with breast cancer were those included in category 4A, punctate microcalcifications with segmental distribution in 66.7% (2/3) of cases; in category 4B, amorphous, heterogeneous punctate microcalcifications, in 57.1% (4/7) of cases; in category 4C, spiculated architectural distortion, in 66.7% (6/9) of cases; for lesions classified as BI-RADS 5, pleomorphic microcalcifications in a branching pattern were present

in 72.7% (16/22) of breast cancers. Overall, the radiological findings most frequently associated with malignant disease were microcalcifications present in 61.5% of total cases (Table 2).

The most frequent malignant breast neoplasm was ductal carcinoma *in situ* in 59.5% (25/42), followed by invasive ductal carcinoma in 33.3% (14/42), lobular carcinoma *in situ* in 4.8% (2/42) and invasive lobular carcinoma in one case.

The diagnosis of atypical ductal hyperplasia occurred in 7.1% (12/169) of total cases, all of them in the category 4. In 66.7% (8/12) of total cases, the findings were microcalcifications, and in 33.3% (4/12), architectural distortion. The two cases classified as BI-RADS 4A presented with clustered, round, linear and punctate microcalcifications, tending to coalescence. On the other hand, category 4B had four cases of amorphous, heterogeneous and punctate microcalcifications, and one case of clustered microcalcifications with linear distribution. In category 4C, one case of clustered, pleomorphic calcifications with linear distribution, and four cases of architectural distortion.

DISCUSSION

The BI-RADS classification has represented the first attempt to standardize mammographic findings in descriptive terms, constituting an important ancillary tool in both in cases of suspect malignancy and definition of conduct to be adopted^(5,7-9). Studies correlating mammographic and histological findings in non-palpable breast lesions employing the BI-RADS classification have found PPV for breast cancer between 12.3% and 47.8%^(4,7,8,10-12). In the present study, 24.8% from the total of biopsied non-palpable breast lesions had a histological diagnosis of malignant disease.

The percentage of probably benign mammographic findings submitted to biopsy was high (17.2%), above the values found by other studies which have ranged between 2% and 11%^(4,7,8,10). As 96.5% of lesions classified as category 3 were benign, this has contributed for decreasing the PPV in the global evaluation of categories by the present study. Analyzing the PPV exclusively in relation to category 3, the

Table 1 Correlation of BI-RADS categories 3, 4A, 4B, 4C and 5 with histological diagnoses.

BI-RADS	Histological diagnosis		
	Benign % (n)	Malignant % (n)	Total n (169)
3	96.6 (28)	3.4 (1)	29
4A	89.7 (26)	10.3 (3)	29
4B	88.7 (55)	11.3 (7)	62
4C	64.0 (16)	36.0 (9)	25
5	8.3 (2)	91.7 (22)	24

Table 2 Distribution of radiological findings in BI-RADS categories 3, 4A, 4B, 4C and 5 in women with breast malignant neoplasm.

Radiological findings	BI-RADS					Total
	3	4A	4B	4C	5	n (%)
Focal asymmetry	1	–	–	–	–	1 (2)
Focal asymmetry with microcalcifications	–	–	–	1	–	1 (2)
Architectural distortion	–	–	–	6	–	6 (14)
Nodule	–	–	1	1	6	8 (19)
Microcalcifications	–	3	6	1	16	26 (62)

value was 3.4% — compatible with mean values reported by other studies^(4,7,8,11). The high number of surgical biopsies in probably benign lesions can be explained by the difficulty to perform a semiannual mammographic follow-up in many patients originating from other locations.

Correlating histological and radiological findings in category 4 breast lesions, in our study, the PPV was 16.4%, while other authors have found PPV ranging between 4% and 45%^(4,7,8,10–12).

In the present study, we have found 12 cases of breast lesions classified as BI-RADS category 4 with diagnosis of atypical ductal hyperplasia which have not been included in the PPV calculation. According to Heywang-Köbrunner et al., the “atypical ductal hyperplasia represents a borderline lesion, whose malignancy risk in comparison with the normal population is increased in four to five times”⁽¹³⁾. If the cases of atypical ductal hyperplasia were included in the category 4 PPV calculation, we would found an increase to 26.7%.

Analyzing the findings in subcategories 4A, 4B e 4C, we have found, respectively, PPV of 10.3%, 11.3% and 36%. If we included atypical ductal hyperplasia in this category, the values would change to 17.2%, 19.4% and 56%. Therefore, these findings have demonstrated an increasing sensitivity of BI-RADS subcategories 4A, 4B and 4C for detecting suspect breast le-

sions and those considered with risk for malignancy.

More recent studies on subcategories 4A, 4B and 4C have not been found in the literature, so it has not been possible to establish a correlation with the values obtained in the present study^(9–12).

As regards category 5, we have found a PPV of 91.7% for malignancy, a value compatible with data of the literature^(4,7,8,10,11). In lesions classified as BI-RADS 5, we have observed one case of sclerosing adenosis, and another of radial scar, situations where a differential diagnosis is not feasible by means of mammography, so this is a mandatory indication for an excisional biopsy^(6,14).

CONCLUSION

The present study has demonstrated that the BI-RADS classification allows a safe prediction of high suspicion for malignancy in lesions classified as category 5, and minimal suspicion in lesions classified as category 3. As regards category 4, a progressive increase in PPV was observed in subcategories A, B and C, demonstrating that this subdivision contributes in a more detailed and accurate way for indicating lesions suspect for malignancy.

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