

Breast, Imaging, Reporting and Data System (BI RADS)

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Introduction

Breast imaging-reporting and data system (BI-RADS) is a classification system proposed by the American College of Radiology (ACR) in 1986 with the original report released in 1993. The 1980s saw an exponential increase in mammography with the implementation of yearly screening mammograms and overwhelming variation amongst radiology reports. BI-RADS was implemented to standardize risk assessment and quality control for mammography and provide uniformity in the reports for non-radiologist. The first version proposed included the suggested structure for a mammographic report, the lexicon for mammographic imaging findings, and final assessment category with recommendations for management. The ACR used scientific analysis and literature review to create a lexicon of descriptors that had shown to correlate with high predictive values associated with either benign or malignant disease. The second important aspect of the BI-RADS system was the category classification for the overall assessment of the imaging findings. The categorization provides an approximate risk of malignancy to a lesion from essentially zero to greater than 95%. The categorization and final assessment decreased ambiguity in recommendations. BI-RADS was built to be fluid and change with the adaptation of new techniques and research. Such changes that have occurred are the inclusion of lexicons for ultrasound in 2003 and MRI in 2006. The latest edition is BI-RADS 5 (2013) and included six classifications for lesions.^{[1][2][3][4][5]}

Issues of Concern

The BI-RADS approach to mammography begins with an efficient and cost-effective categorization to mammograms. A patient is placed in one of two categories: screen or diagnostic. A screening mammogram is for a patient that has no complaints as well as a normal examination by her primary care physician. If there is

any reason for concern such as pain, a palpable lump, or discharge the patient does not qualify for a screening mammogram and must be placed in the diagnostic category. Screening mammograms can be obtained without the presence of an interpreting radiologist. A diagnostic mammogram must be obtained with "direct supervision" of an interpreting physician so that all needed images for interpretation can be acquired during the patient's visit. The diagnostic category includes any patient who presents with concern, their primary physician having a concern, or a concerning finding on their screening mammogram, hence, additional imaging is required. The BI-RADS guidelines also outlined a template to universalize mammography reports. The suggested structure of a mammographic report by BI-RADS includes the following sections: breast density, imaging findings (using the appropriate lexicon), final assessment, and management. The use of a structured report was presented for uniformity between radiologist's reports in a group as well as between breast centers, allowing for non-radiologists to follow reports from different breast centers with more clarity.[6][7][8]

The BI-RADS lexicon is a dictionary of descriptive terms used to describe a mammographic, ultrasound, or MRI finding. As discussed, the original BI-RADS included only a mammographic lexicon. For practical purposes, only the fifth edition mammography lexicon will be described. The mammographic lexicon includes category descriptions for breast composition or density, masses, calcifications, asymmetries, associated features, and location of the lesion. A mammographic report will begin by stating the breast density using the allowed breast densities lexicon as fatty, scattered, heterogeneously dense, and extremely dense. If a mass is seen, three descriptions are required, shape, margin, and density. The shape can be round, oval, or irregular. The margins can be circumscribed, obscured, microlobulated, indistinct, and spiculated. And the density of the mass can be high density, equal density, low density, and fat-containing. Of these descriptions, a mass that is an irregular shape with spiculated margins and is high density is the most concerning for malignancy. Whereas, a mass that is a round shape with circumscribed margins is more likely benign, especially if it is fat-containing. There are many descriptions for calcifications and for simplicity we will only name a few of the common ones. Common characteristics of benign calcifications on a mammogram include such descriptors as large rod-like, popcorn, coarse, vascular, and milk of calcium. Common suspicious calcification characteristics include amorphous, fine pleomorphic, and fine-linear branching. A group of calcifications are then described by their distribution in the breast and can be: diffuse, regional, grouped, linear, and segmental. Associated features include such findings as the presence of skin or nipple retraction, skin or trabecular thickening, and axillary adenopathy. Additional approved descriptive words are architectural distortion, intramammary lymph node, skin lesion, and solitary dilated duct. The location of a finding is the last descriptor and can be described as laterality, quadrant or clock face, depth or distance from the nipple. As with mammography there are approved lexicons for ultrasound and MRI

that will not be detailed in depth here. A complete listing of the approved lexicon can be found on the ACR website.

The final assessment includes the BI-RADS 0 to 6 categorization. A category assessment of BI-RADS 0 refers to an incomplete evaluation with further imaging required including additional mammographic views including spot compression or magnification and or ultrasound. BI-RADS 1 refers to a negative examination, meaning that there are no masses, suspicious calcifications or areas of architectural distortion. There can be no description of a finding in the report if it is categorized as a BI-RADS 1. BI-RADS 2 is consistent with benign findings. Benign findings include secretory calcifications, simple cysts, fat-containing lesions, calcified fibroadenomas, implants and intramammary lymph nodes. BI-RADS 3 is probably benign and should have shortened interval follow-up to determine stability. The risk of malignancy is below 2%. There are very strict classifications to qualify a finding in the BI-RADS 3 category: a non-palpable, circumscribed mass on a baseline mammogram; a focal asymmetry, which becomes less dense on spot compression images, or a solitary group of punctate calcifications. Any findings other than this cannot be placed in the category 3. BI-RADS 4 is a suspicious abnormality, which can represent the chance of being malignant (in percent). The BI-RADS category 4 is subdivided into a, b, and c. The subcategory of (a) has a low probability of malignancy with a 2% to 10% chance of malignancy. The subcategory of (b) has an intermediate change of malignancy ranging from 10% to 50%. The subcategory of (c) has a high probability of malignancy ranging from 50% to 95%. BI-RADS 5 is highly suggestive of malignancy more than 95%. If something is placed in this classification and the pathology comes back as benign, the recommendation is still surgical consultation, because the pathology is discordant with the radiographic findings. The last category that was recently added is the BI-RADS 6, used for pathology proven malignancy.

Clinical Significance

The collective collaboration by the ACR, AMA, National Cancer Institute, Centers for Disease Control and Prevention (CDC), FDA, American College of Surgeons, and College of American Pathologist to create the BI-RADS guidelines allowed for broad support and an effective transition to BI-RADS nationally. The fluidity of BI-RADS allows for it to evolve with changes in technology and research. The standardized reporting allows non-radiologist to follow mammographic reports generated anywhere in the country easily. BI-RADS pioneered the standardization in radiology reporting and accomplished its goal to be efficient and provide a cost-effective approach that will continue to be used in the foreseeable future.[9][10]

Questions

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