Interactive Case Review of Radiologic and Pathologic Findings from Breast Biopsy: Are They Concordant? How Do I Manage the Results?

Christopher P. Ho, MD • Jennifer E. Gillis, MD • Kristen A. Atkins, MD • Jennifer A. Harvey, MD • Brandi T. Nicholson, MD

The number of imaging-guided percutaneous breast biopsies performed has steadily increased as imaging techniques have improved. Percutaneous biopsy is becoming more commonplace and supplanting excisional biopsy as the preferred diagnostic tool. The radiologist’s role in caring for patients who undergo breast biopsy extends beyond imaging to identifying lesions for biopsy and then performing the procedure. Radiologists must also be cognizant of radiologic-pathologic correlation to determine whether biopsy results are concordant with imaging findings and make management recommendations. Management of microcalcifications, masses, and areas of asymmetry begins with recognizing and characterizing the findings with the proper Breast Imaging Reporting and Data System (BI-RADS) lexicon. Determining concordance between imaging findings and histologic results is equally important. The decision to recommend surgical excision or short-term follow-up relies heavily on whether the histologic diagnosis correlates with the imaging findings, a determination that is part of the radiologist’s responsibilities if he or she performs the biopsy. Supplemental material available at http://radiographics.rsna.org/lookup/suppl/doi:10.1148/rg.334125123/-/DC1.

Introduction
As breast imaging techniques evolve and improve, so does the ability to detect early and potentially curable forms of breast cancer. In the past, surgical excision and biopsy were the mainstays of establishing a pathologic diagnosis. However, concurrent with the evolution of imaging techniques, the ability to perform imaging-guided percutaneous biopsy has substantially improved. Whether ultrasonography (US) or stereotactic or magnetic resonance (MR) imaging is used to guide biopsy, the number of percutaneous breast biopsies performed in the United States has steadily risen over time. Between 1999 and 2004, the number of breast biopsies performed in the United States rose by 43% (1). Among the approximately 150,000 breast biopsies performed...
in 2004, imaging guidance was used in 86% (1). With the rise in minimally invasive breast biopsies performed and increased participation of radiologists, it is important to be familiar with the following concepts: (a) classification of Breast Imaging Reporting and Data System (BI-RADS) stage 4 and 5 lesions, including suspicious microcalcifications, masses, and asymmetries, with all available imaging modalities; (b) use of appropriate imaging modalities to guide percutaneous biopsy; (c) concordance of imaging findings with expected histologic findings; and (d) appropriate follow-up and treatment of patients based on correlation of radiologic-pathologic findings.

The advantages of minimally invasive imaging-guided breast biopsy over surgical biopsy are undisputed and include shorter recovery time, lower patient cost, minimal scarring, and relative safety. In addition, the sensitivity and specificity of imaging-guided biopsy approach those of open-surgery biopsy, a result of improved imaging techniques and biopsy equipment (2). To successfully perform a minimally invasive breast biopsy, it is important to not only be familiar with the technique, but also how to determine radiologic-pathologic concordance and the appropriate treatments for patients after the procedure. In this article, we use a case-based system to review radiologic-pathologic correlation of breast lesions and the appropriate BI-RADS lexicon and classification, with a discussion of concordance and case management. The accompanying online tutorial (PowerPoint slides [online]) presents typical diagnostic cases and allows users to participate in all stages of case management, from diagnosis to treatment selection. In each case, a different diagnostic problem with unique radiologic and pathologic findings is presented, with a summary slide discussing the pathologic entity.

Calcifications
Microcalcifications seen at mammography account for approximately 55% of detected non-palpable breast malignancies (3). In addition, microcalcifications account for 85%–95% of all screening-detected cases of ductal carcinoma in situ (4). The advent of the BI-RADS lexicon for calcifications allows radiologists to not only describe calcifications on the basis of their morphologic characteristics and distribution, but also to stratify risk and determine the malignant potential of microcalcifications on the basis of their BI-RADS descriptors (Table).

If stereotaxy-guided biopsy of calcifications is performed, it is important to also be prepared to determine radiologic-pathologic concordance. To do this, first ensure that the correct calcifications were adequately sampled. This may be done by imaging the biopsy specimen to confirm that the calcifications are included. After sampling, a biopsy marker should be placed to confirm that the correct calcifications were sampled and to mark the biopsy site should it be necessary to excise residual calcifications or surrounding tissue after histologic analysis. The biopsy marker may be deployed with the breast compressed; however, after completion of the procedure, two-view (typically, craniocaudal and mediolateral) mammography should be performed to confirm that the correct calcifications were sampled and that the biopsy marker did not migrate.

Overall positive predictive value (PPV) for use of biopsy and histologic analysis of microcalcifications to determine malignancy is approximately 21.7% (5). When reviewing pathologic results for concordance, it is important to ensure that microcalcifications are identified in the histologic specimen and the specific pathologic diagnosis is consistent with the morphologic characteristics seen at mammography and the pretest probability of malignancy. Correlation of mammographic findings with the pathologic diagnosis facilitates determination of appropriate follow-up care.

If results of pathologic analysis of calcifications are benign, then radiologists must first reassess the specimen to determine if it is a satisfactory sample of the finding. The next step is to assess whether the pathologic findings explain the imaging findings. For example, is excision required? Typically, if results of pathologic analysis are benign and concordant, we recommend that patients return in 6 months for short-term follow-up mammography with magnification views to ensure that the calcifications are stable (6). In the case of a specific benign result, such as fibroadenoma in a patient who underwent biopsy of coarse heterogeneous calcifications, follow-up may be performed in 12 months. If results are less specific, such as fibrocystic change, follow-up may be performed in 6 months. At follow-up examination, if no substantial or worrisome changes in the morphologic characteristics or number of calcifications are pres-
ent at the follow-up examination, the patient may return to the general screening population.

The included cases include microcalcifications and allow users to navigate through the entire work-up process, from screening to diagnosis and biopsy management. Users are expected to classify microcalcifications on the basis of their distribution and morphologic characteristics with the appropriate BI-RADS lexicon. Then, specific pathologic diagnoses are presented and further discussed.

Masses

With the development of the BI-RADS lexicon, characterization and stratification of the risk for malignancy of breast masses at mammography and US are more straightforward. According to the BI-RADS lexicon, a mass is a “space-occupying lesion seen in two different projections” (7). Most masses that are depicted at mammography should be further evaluated with spot compression views and US to assess their characteristics (eg, shape, margins, and whether they are cystic or solid). Use of the BI-RADS lexicon descriptors for breast masses may help dictate the BI-RADS assessment and recommendation for treatment. The description of a mass seen at mammography should include its shape, margins, and density; likewise, that for a mass seen at US should include its shape, margins, and echo pattern, as well as its orientation, boundaries, and posterior acoustic features.

It is important that the BI-RADS lexicon be used appropriately because its terms not only describe masses, they also help confer a degree of suspicion, with certain descriptors favoring a benign or malignant diagnosis. The BI-RADS descriptors with the highest PPV for malignancy are those that describe an irregular shape (73%) or spiculated margins (81%) (8). In addition, the density of a mass may help stratify risk: There is a significant association between high-density masses and malignancy, with previous studies reporting a PPV of just over 70% (9). Use of the BI-RADS mass descriptors helps assess risk and determine the appropriate BI-RADS category, be it benign (BI-RADS 2); probably benign, requiring short-term follow-up (BI-RADS 3); suspicious for malignancy, requiring further evaluation with biopsy (BI-RADS 4); or highly suspicious for malignancy (BI-RADS 5).

Masses that are classified as BI-RADS category 4 or 5 require biopsy. As with all imaging-guided biopsies, the radiologist must determine concordance after receiving the results of pathologic analysis by asking certain questions, such as, does the histologic diagnosis correlate with imaging findings, and, if the mass is discrete, do the histologic results indicate a specific diagnosis? If the results are discordant or unexpected, surgical excision or possibly another biopsy should be recommended, depending on the situation. At our institution, if histologic findings correlate with imaging findings as expected, 6-month follow-up is recommended in patients with benign results of pathologic analysis. At the follow-up examination, both the histologic and imaging findings should be revisited, and the mass should be assessed at mammography or US to ensure that it is stable. If it has grown in size or its morphologic characteristics have changed (ie, become more suspicious), appropriate action should be taken, typically surgical removal (6).

Management

For all lesions, the radiologist must assess the adequacy of the sample and evaluate for concordance, and, if biopsy was performed to evaluate calcifications, the pathologist should determine whether calcifications are present and accounted for at histologic analysis. In the setting of a BI-RADS 4 lesion, a benign result typically is acceptable. However, specific diagnoses may not explain the imaging findings. For instance, if a discrete mass is biopsied, histologic results should be recognized as a reasonable explanation for the imaging findings. For results deemed benign discordant, a 6-month follow-up evaluation is commonly recommended. If the lesion is stable at follow-up examination, the patient may return to the general screening population. If calcifications increase in number or extent or the mass changes (ie, increases in size or its features become more suspicious), surgical excision is typically recommended. For results deemed benign discordant, surgical excision is recommended. Repeat core biopsy may also be considered if an issue in targeting is present. For example, stereotactic core biopsy may be performed in a lesion sampled with US guidance and ultimately found to not correlate with initial mammographic findings. For results classified as high risk or malignant, referral to a breast surgeon is recommended and excision is planned after appropriate staging.

Summary

Imaging-guided, minimally invasive procedures are becoming more commonplace, and the radiologist’s role in establishing radiologic-pathologic concordance is paramount. Understanding the differential diagnoses for common mammographic findings will help radiologists recognize discordant biopsy results. The accompanying interactive cases
include multiple masses seen at mammography and US, and users are given the opportunity to classify them by using the appropriate BI-RADS lexicon. For each case, specific pathologic diagnoses are presented and discussed.


References

27. Ishikawa T, Hamaguchi Y, Ichikawa Y, et al. Locally advanced mucinous carcinoma of the breast: mammographic and US, and users are given the opportunity to classify them by using the appropriate BI-RADS lexicon. For each case, specific pathologic diagnoses are presented and discussed.
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