Contemporary Breast Imaging and Concordance Assessment: A Surgical Perspective

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KEYWORDS

• Surgeons • Breast • Ultrasonography
• Magnetic resonance imaging • Mammography • Concordance
• Quality measures

Disease conditions of the breast and the surgery to treat them are common. The lifetime risk for a woman to develop breast cancer is 12%.[1] Silverstein and colleagues[2] estimated that 1.7 million breast biopsies are performed annually in the United States, and the American Cancer Society estimates that 209,000 new cases of invasive breast cancer will be identified in 2010.[1] Nearly all of these patients will undergo breast imaging for screening or diagnostic evaluation. The aim of this article is to discuss contemporary methods of breast imaging along with their applicability and use by surgeons. From the surgeon's perspective, breast imaging never occurs in a vacuum; rather, imaging occurs in the context of a patient history, family history, clinical examination, and sometimes a prior image-guided core needle biopsy (CNB). Given this information, it is a surgeon's responsibility to perform patient risk and concordance assessment, and then establish a working diagnosis and action plan.

In this review, the modalities of mammography, breast ultrasonography (US), and breast magnetic resonance imaging (MRI) are discussed. The content of this report

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MAMMOGRAPHY

Mammography is used for both screening and diagnostic purposes. The history of screening mammography in the United States dates back approximately 50 years. The first breast cancer screening trial began in 1963 when women aged 40 to 64 years who were enrolled in the Health Insurance Plan (HIP) of Greater New York were randomly assigned to study and control groups.[3] The study group was invited for an initial screening, consisting of clinical breast examination and 2-view film mammography (cephalocaudal and lateral), with 3 subsequent annual reexaminations. At 18 years, for women ages 40 to 49 and 50 to 59 at the time of entry, a reduction in breast cancer mortality of approximately 25% was reported.[3] Following initial reports in the late 1960s and early 1970s of a reduction in breast cancer mortality from invited mammographic screening, the Breast Cancer Detection Demonstration Project (BCDDP) was implemented in 1973 and continued through 1980. The BCDDP was initially a method to disseminate breast cancer screening to the public and to medical professionals, but a Data Management Center was added just months following initial enrollment.[4,5] The BCDDP study was sponsored by the American Cancer Society (ACS) and the National Cancer Institute (NCI) and enrolled 283,222 women, 35 to 74 years old, at 29 centers across the United States. Women in the study received 5 annual physical examinations with 2-view mammography. Four thousand two hundred and seventy-five women were diagnosed with breast cancer during the course of this study. In 1997, 96% 20-year follow-up data were available for analysis. In retrospect, a high proportion of the cancers were diagnosed by imaging alone (43.7% for women 40–49 years old and 49.6% for women 50–59 years old). Ninety-five percent of diagnoses involved 2-view mammography, and 28.6% were smaller than 1.0 cm. The overall adjusted survival rate was 80.5%, though it was 90.2% for cancers smaller than 1.0 cm.[6] Meanwhile, outside the United States, the Swedish Two-County Trial, another early landmark randomized controlled breast cancer screening trial that began enrollment in 1977, resulted in a 32% reduction in breast cancer–related mortality at 20-year follow-up.[7,8] Additional long-term follow-up of these studies is available in the literature.[9–12]

Current breast cancer screening recommendations by many professional organizations for women at average risk for breast cancer are relatively similar to screening protocols of the earliest breast cancer screening trials. The American College of Radiology (ACR), ACS, ASBrS, and National Comprehensive Cancer Network (NCCN) have issued similar recommendations for screening mammography.[13–18] Screening mammograms for women should begin at age 40 and should be continued for as long as they remain in good health,[16] or until a decision to stop routine mammography has been reached through an informed decision between the woman and her physician.[13] The ACR recommends 2-view imaging to include craniocaudal (CC) and mediolateral oblique (MLO) views, with additional views as required for optimal or complete visualization.[13] According to the ACS, women should be advised regarding the potential benefits (detection) and risks (false positives) of breast self-examination (BSE) and choose, themselves, whether to perform BSE regularly, intermittently, or not at all.[16] Clinical breast examination by a health care professional is recommended every 3 years for women 20 to 39 years old, and then annually, and screening mammography should occur at the same age as initiation of yearly breast