Ultrasonography of the Postsurgical Breast Including Implants

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• Breast • Breast neoplasms • US • Implants
• TRAM flap • Reduction mammoplasty
• Breast conserving surgery

The breast is one of the most common sites of surgical procedures performed for diagnostic and therapeutic or reconstructive purposes. Surgical interventions lead to many alterations in the breast tissue causing difficulty in the interpretation of clinical and radiologic findings. These changes resolve almost completely within the first year after benign biopsy, with minor architectural distortion and scarring remaining. They can be accentuated and prolonged considerably after cancer surgery, however, mostly as a result of the effects of radiation therapy.[1,2]

Although postsurgical changes can resemble malignant lesions in some patients, they also can mask signs of malignancy in others. It is important for radiologists to detect and appropriately recognize these alterations to diagnose recurrent tumor as early as possible, while there still is a chance for curative surgery. It also is important to avoid overdiagnosis in these patients so as not to lead to unnecessary biopsies of irradiated tissues where healing processes might be disturbed.

Ultrasonography (US) is a useful adjunct to mammography for the evaluation of operated breasts. It not only gives valuable information in the evaluation of palpable masses and suspicious mammographic opacities but also can increase diagnostic accuracy in the follow-up of these patients. Because it is a cross-sectional modality, it is less affected by the architectural distortion and edema caused by surgery and therapy. Augmented breasts also are easier to evaluate by US compared with mammography.

Evaluation of the treated breast is one of the most challenging aspects of breast imaging. This article reviews the sonographic findings in operated breasts with the main focus on the conservatively treated breast. Also reviewed are the findings associated with excisional biopsies, breast implants, augmentation, and reduction mammoplasties.

CONSERVATION THERAPY FOR BREAST CANCER

Prospective randomized trials have established that there is no significant difference in the survival outcome of patients treated with mastectomy versus breast conservation therapy.[3–8] The success of conservative treatment depends, however, on the appropriate selection and follow-up of eligible patients. It also depends on the trusted cooperation of a team of physicians; experienced radiologists are important members of this team.

During the preoperative period, the main responsibility of a breast radiologist is to determine the disease extent as accurately as possible. Tumor size is an important determinant in the choice between breast-conserving surgery and mastectomy. Although there is no absolute size measurement that makes breast conservation impossible, in patients who have tumors larger than 5 cm, mastectomy usually is preferred. The more important factors for determination of the type of surgery are the ratio of the size of the tumor to the size of the breast and presence of multicentric disease.[1,9,10] Studies have shown that US is more

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sensitive than mammography in demonstrating additional foci of tumor in patients who have breast cancer.[11–14] In the author's institution all patients who have breast cancer who have dense breast parenchyma (Breast Imaging Reporting and Data System [BI-RADS] 3 or 4) undergo US examination of bilateral breasts before type of surgery is determined. If multicentric foci or suspicious contralateral lesions are demonstrated, core-needle biopsy is performed. Although MR imaging is more sensitive in this context,[11–20] US is inexpensive, more rapid, practical, and almost as successful in experienced hands. If no additional lesions are seen on US, patients benefit from MR imaging, which has been shown to change management in 10% to 48% of patients.[11–13,17–22] This variability in results regarding the contribution of MR imaging to the preoperative assessment of tumor extent depends mainly on the differences in study designs and possibly also on the levels of expertise, especially for US examination. Additional tumor foci detected on MR imaging should be searched with second-look US. Demonstration of these lesions with US is important because of the chance for US-guided biopsy. It has been reported that as much as 23% to 55% of lesions (especially malignant ones) detected on MR imaging can be demonstrated with second-look US.[23,24] In the author's experience, however, the sensitivity of second-look US is much lower than this, probably because US always is performed before MR imaging and most of the lesions are detected on this primary US examination.

During the perioperative period, a breast radiologist has to localize any nonpalpable lesions and document accurate sampling and complete excision with specimen radiography. Specimen US also is possible for lesions that are visible only on US examination or that are localized under US guidance. Specimen US usually is performed for tumors that present as masses. For lesions, such as architectural distortions, or indistinct hipoechoic areas, specimen US examination may not be accurate.[10] Lesion localization and evaluation of the specimen also can be performed in an operating room with intraoperative US examination.[7,25–27]

Specimens should be evaluated while patients are in the operating room, and confirmation of excision and proximity to the margins should be reported. If a suspicious lesion is not seen in the specimen, or if a lesion is close to the margins, a surgeon is informed and re-excision is performed. The re-excision material also should be examined. On specimen radiography two orthogonal views are needed to determine whether or not the tumor extends to the margin of the specimen. Evaluation of the margins is easier with US because it is possible to examine the specimen in different planes. It should be kept in mind, however, that clear margins on specimen radiography or specimen US are not enough to exclude margin involvement. Histologic evaluation is the gold standard, although sometimes histologic and radiologic evaluations can be complementary.[1,28]

Early postoperative evaluation of the breast generally is indicated only for tumors that present as microcalcifications. In these patients, mammography of the operated breast is obtained 2 to 4 weeks after the operation, before radiation therapy is initiated, to determine whether or not there are any residual calcifications.[10] Presence of residual calcifications does not necessarily mean residual tumor and absence of calcifications does not exclude residual disease. Therefore, demonstration of residual calcifications on postoperative mammograms may or may not lead to re-excision. However, their detection in this baseline mammogram may be helpful for the future follow-ups.[9,28] For noncalcified tumors that are excised with negative margins, early postoperative imaging usually is unnecessary, because architectural distortion, hematoma, and edema that develop in the breast make mammographic interpretation difficult.

In women who have positive margins on histologic examination, evaluation of the breast for residual disease may be necessary. MR imaging has been reported as the most accurate method in demonstrating the extent of residual disease in these patients, although it may lead to false-positive results resulting from early postoperative changes.[29–33] The superimposition of the residual fibroglandular tissue with architectural distortions, edema, and postoperative fluid collections usually impedes mammographic interpretation and inadequate compression of the painful edematous breasts makes interpretation more difficult. US may be more helpful in these patients and may show residual masses (**Fig. 1**). Because of the variable appearance and irregularity of the surgical cavity and postoperative hematoma, much experience is needed for US evaluation of the surgical bed. Occasionally, surgeons perform excisional biopsy of a suspicious palpable lesion without prior radiologic evaluation of the breast. On detection of malignancy, patients are sent to a radiology department before definitive treatment, even if the surgical margins are negative. They also benefit more from US examination, because of the reasons discussed previously, but mammography again is needed to exclude the possibility of residual malignant-type microcalcifications.

After radiotherapy is completed, a baseline mammogam is indicated in 3 to 6 months to