



Current Best Clinical Indications for Breast MRI

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Bruce A. Porter, MD

Medical Director

First Hill Diagnostic Imaging, Seattle, Washington

The following summarizes Dr. Porter's presentation.

Advantages of MRI

- MRI has the ability to image in three dimensions and provide good physiologic and morphologic information. However, except in high-risk patients, MRI should be viewed primarily as a problem-solving tool and not a screening tool.
- MRI provides unique information that helps women and their surgeons make better treatment decisions. Feedback from surgeons suggests that MRI prior to surgery helps reduce the number of positive or inadequate margins on difficult tumors such as ductal carcinoma in situ (DCIS) and lobular cancers.

MRI Indications Overview

- MRI should not be used to distinguish a benign from a malignant process or to preclude biopsy of a clinically suspicious lesion.
- MRI is virtually a map of the androgenic process, and some lower grade tumors and DCIS may not enhance on MRI, probably reflecting the tumor biology and the prognosis.
- In contrast to published experimental studies, in clinical practice, MRI is not used as a stand-alone modality.

MRI Indications: Lobular Cancer

- Lobular cancer is one of the most common indications for MRI. It is frequently multifocal and multicentric and often bilateral.
- It is a common cause of false-negative mammograms because of its diffuse, infiltrative nature, and a common cause of positive margins. However, lobular cancer can be clinically occult and may also be difficult to identify on MRI.
- In the past, the option for most patients with lobular carcinoma was mastectomy. With MRI, many of the cancers found will be small (e.g., 1 to 1.5 cm) allowing the patient the option of breast-conserving surgery.
- One procedure found to be particularly effective is a three-dimensional technique with very high contrast. Figure 1 shows the axial or maximum intensity projection (MIP) image. The heart and the infiltration of a considerable portion of the central left breast are visible. (See presentation slide 10.)

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- Presentation slide 11 shows a coronal projection of the left breast. The extent of the tumor is easily visible and viewing this image often helps the patient understand the rationale behind a mastectomy recommendation.

Occult Breast Cancers

- MRI can be useful in detecting occult cancers. About 0.3% of patients present with malignant axillary lymph nodes but normal mammograms and physical examination. In the past, the standard treatment of these patients has been mastectomy.
- Although MRI has very little spatial resolution in comparison to mammography, its high contrast can detect the primary tumor in most cases and allow breast-conserving surgery.

Suspected Multiple or Bilateral Cancers

- MRI often detects multifocal, multicentric, or bilateral cancers.
- Unsuspected contralateral tumors are detected in 3% to 6% of cases. The detection of unsuspected tumors in the opposite breast has a profound effect on morbidity and the cost of the care by allowing patients to undergo treatment once rather than multiple times.

Close or Positive Surgical Margins

- Inadequate margins occur in up to 50% of patients following lumpectomy, thus requiring additional surgery.
- MRI can often locate residual or additional tumors. If routinely used preoperatively, MRI may decrease reoperation rates and improve surgical planning.
- Presentation slide 12 (top) illustrates a patient with a mixed ductal lobular cancer of the right breast with an attempt at a lumpectomy. She had a positive margin and a subsequent re-excision, also with positive margins. After two surgeries the MRI reveals a spiculated mass extending to the pectoralis muscle.
- Presentation slide 12 (bottom) illustrates a sagittal reconstruction from the axial data set. As can be seen, the mass extends towards the nipple.
- As these images demonstrate this patient was not an appropriate candidate for lumpectomy. Mammography did not detect the extensive nature of the tumor, thus underscoring the importance of the use of multiple imaging tools.
- MRI is likely to have an expanding role in surgical planning in some breast cancers, thereby avoiding multiple surgeries.

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Postoperative Scar Versus Tumor Recurrence

- At ≥ 6 months after surgery, “mature scar,” which may simulate cancer morphologically, does not enhance. The negative predictive value of MRI in this setting is high. This is clinically useful, because it provides a much higher level of confidence than do serial mammograms, ultrasound, and physical examination.
- In contrast, recurrent tumor enhances and usually has a malignant-type enhancement curve that allows detection.
- Presentation slide 16 illustrates a 3-D image of skin recurrence in a patient 18 months post lumpectomy, radiation and bone marrow transplant. The tumor, visible in the upper outer quadrant, eluded both detection and treatment as well.

Monitoring of Neoadjuvant Therapy or Brachytherapy

- MRI improves accuracy of tumor size classification and nodal staging and also documents therapeutic response and detection of multifocal, multicentric cancers.

Problematic Mammograms

- In carefully selected cases, MRI may be helpful in clarifying equivocal or suspicious mammographic findings. Detailed mammographic evaluation and ultrasound must be done first, however.
- The extent of higher grades of DCIS is often well seen with MRI.

MRI and DCIS

- Detection of DCIS remains primarily a mammographic issue, as MRI and ultrasound may not detect some in situ cancers and other low grade benign or malignant lesions. Significantly higher spatial resolution with MRI is forthcoming.
- Although MRI is currently considered an adjunct to mammography, a role is emerging for MRI in determining extension and infiltration patterns in higher grade DCIS.
- Presentation slide 25 illustrates radial reconstructions in DCIS. Note the clump pattern of the DCIS and the interductal spread of the tumor.

Conclusions

- MRI is a problem-solving tool, not a general screening exam.
- MRI should not be used to preclude biopsy.
- MRI is best used with selected, specific indications and as an *adjunct* to mammography
- MRI can affect the clinical staging of the patient and has the potential to markedly improve preoperative planning and patient management.
- MRI will soon be an expected capability at major breast imaging and treatment facilities, not just for high risk screening.
- MRI is a technique *for mammographers* and should be integrated into mammographic practice.