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Male Breast Magnetic Resonance Imaging: When is it Helpful? Our Experience Over the Last Decade

Kyungmin Shin, MD*, Sarah Martaindale, MD, Gary J. Whitman, MD

The University of Texas MD Anderson Cancer Center, Houston, TX

Currently, there are no clear indications or guidelines for performing breast magnetic resonance imaging (MRI) in male patients diagnosed with primary breast cancer. The literature is also very limited on the usage of breast MRI in male patients. Although it is not common or recommended as a routine clinical practice to perform breast MRI in male patients even in the setting of a diagnosis of breast cancer, there are few instances where MRI may help clinicians and surgeons. With a comprehensive review of cases that was performed at our institution over the last 10 years, the readers may achieve better understanding of when it may be helpful to perform breast MRI in male patients.

Introduction

Usage of contrast-enhanced breast magnetic resonance imaging (MRI) has been continuously increasing with continued advancement in technology. MRI is the most sensitive imaging modality for detection of breast cancer, when compared to mammography and sonography, as shown in numerous studies.[1-3] The indications for breast MRI are well delineated in female patients with clear categories. The major indications for breast MRI in female patients are for high risk screening in patients with a 20% or greater lifetime risk of developing breast cancer and evaluation of extent of disease and screening for the contralateral breast in patients with newly diagnosed primary breast cancer. Less common indications include evaluation of metastatic axillary lymphadenopathy with an unknown primary tumor, evaluation of residual disease postbreast conservation surgery with positive margins, monitoring response to neoadjuvant chemotherapy, locoregional recurrence evaluation, problem solving after inconclusive mammography, suspicious nipple discharge without an imaging correlate, and silicone implant integrity evaluation.[4,5]

Breast MRI in male patients, however, is infrequently performed even in the setting of a newly diagnosed primary breast cancer. This, however, is not due to underusage of breast MRI in male patients, but rather because MRI is not necessary most cases in male patients. As a result, the literature on usage of breast MRI in male patients is quite limited. Even though contrast enhanced breast MRI is not indicated in most male breast cancer patients, there are instances in which breast MRI helped our clinicians and surgeons for better management of the patients at our institution. Such cases will be demonstrated in detail in this article, which should help the readers understand when it may be appropriate to perform breast MRI in male patients and what to look for when interpreting the studies.

Examples of When Breast MRI May be Helpful in Male Patients

The cases described in detail in this article demonstrate when breast MRI in male patients may be helpful to surgeons and clinicians. Breast MRI, as in females, is helpful in evaluation of the posterior extent of disease for possible chest wall involvement in male patients as well as female (Fig 1). This is especially true for posterior cancers that make posterior margins difficult to evaluate on ultrasound (US) due pronounced posterior acoustic shadowing and incomplete imaging of the posterior margins on mammography due to the posterior location.

MRI can also be used in evaluation for possible primary breast mass in setting if clinical diagnosis of inflammatory breast cancer (Fig 2) and evaluation for potential skin involvement in a known malignancy (Figs 3 and 4) when clinically suspicious. Similar to one of the indications of breast MRI for female patients, MRI can also be used in male patients for evaluation for residual disease postsurgery (Fig 5). It is important to note is that it is essential to perform the MRI immediately after the surgery before the formation of granulation tissue, which could make interpretation difficult.

Similarly, postsurgical follow-up or screening in a select subset of male patients may be performed with breast MRI in conjunction with mammography and US (Fig 6). However, it needs to be noted that this should not be a routine practice in male patients as serial clinical follow-up would suffice in most male patients.

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* Reprint requests: Kyungmin Shin, MD, The University of Texas MD Anderson Cancer Center, 1515 Holcombe Blvd, Unit 1350, Houston, TX 77030.

E-mail address: kshin1@mdanderson.org (K. Shin).

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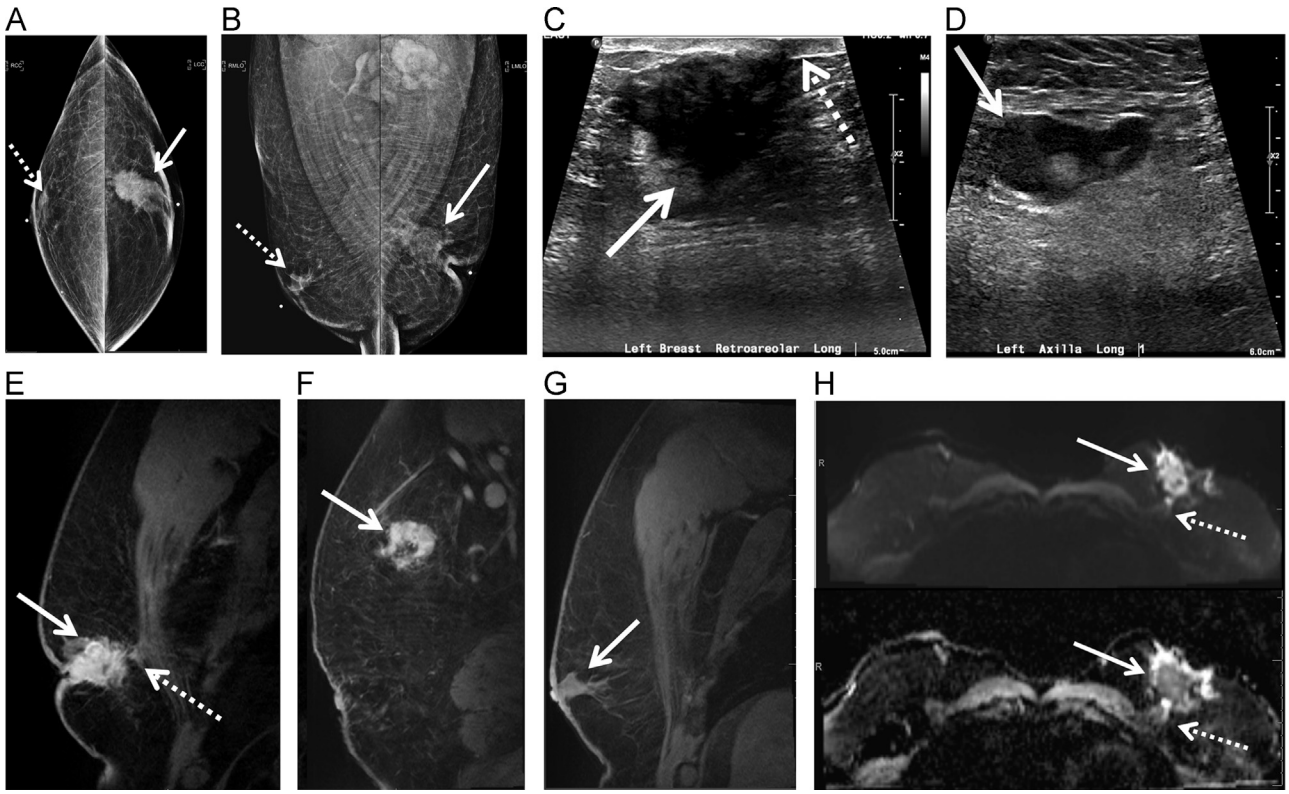

FIG 1. A 56-year-old male initially presented with left nipple inversion. CC (A) and MLO (B) mammographic views demonstrate a 4 cm irregular, high-density mass with spiculated margins in the retroareolar left breast (solid arrows). There is also associated left axillary lymphadenopathy, left nipple retraction, and skin thickening. Incidental mild gynecomastia on the contralateral right breast is also noted (dotted arrow). On a greyscale ultrasound (US) image (C), an irregular, hypoechoic mass with indistinct margins is seen in the retroareolar left breast as a mammographic correlate (solid arrow). There is associated left nipple extension or invasion (dotted arrow). An US-guided core needle biopsy of this mass yielded invasive ductal carcinoma. US image of the left axilla (D) demonstrates a suspicious left axillary level I lymph node with eccentric cortical thickening (solid arrow). Fine needle aspiration (FNA) of this lymph node showed metastatic disease. Sagittal T1-weighted postcontrast with fat suppression images (E and F) show the corresponding large, heterogeneously enhancing, irregular left retroareolar mass (solid arrow) (E) with mild tethering of the pectoralis muscle (dotted arrow). There is associated left nipple retraction. There is also an abnormal left axillary lymph node (solid arrow) (F), corresponding to the biopsy proven metastatic lymph node seen on US. Indistinct margins of the lymph node suggest extracapsular extension of the metastatic disease, proven by the surgical pathology. Sagittal T1-weighted MRI postcontrast with fat suppression (G) of the right breast demonstrates the mild gynecomastia (solid arrow) as was seen on mammography. Diffusion-weighted imaging (DWI) and corresponding ADC map (H) shows restricted diffusion within the left retroareolar mass (solid arrows). Also demonstrated was mild tethering of the pectoralis muscle (dotted arrows).

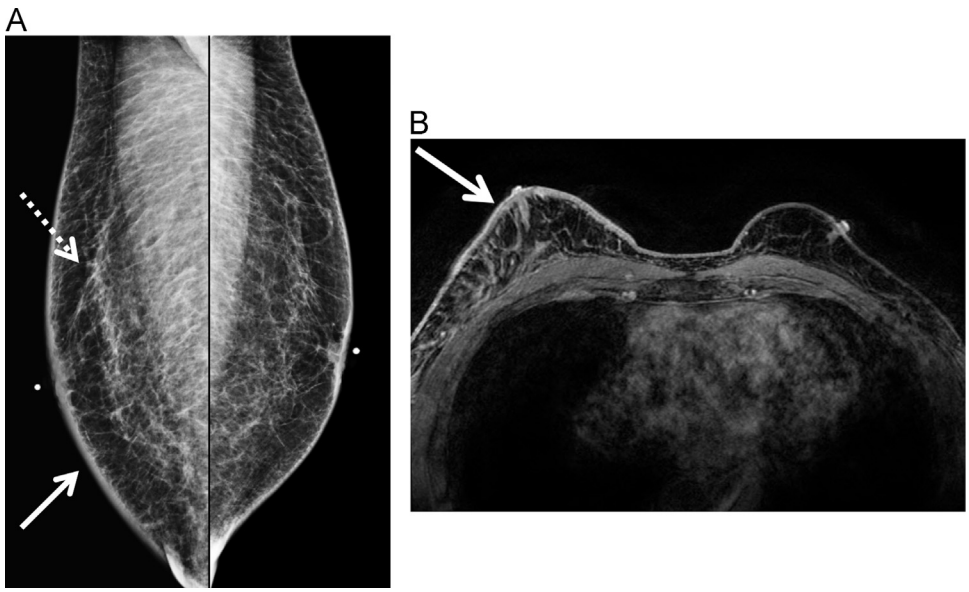

FIG 2. A 66-year-old male presents with a clinical diagnosis of right breast inflammatory breast cancer. The work-up started with diagnostic mammography. Bilateral MLO views (A) demonstrate diffuse skin (solid arrow) and trabecular thickening (dotted arrow) in the right breast, consistent with the clinical diagnosis of inflammatory breast cancer, without evidence of a primary breast mass. Axial T1-weighted fat suppressed postcontrast MRI (B) shows diffuse skin and trabecular thickening and enhancement in the right breast (solid arrow), corresponding to the mammographic findings and in keeping with clinical diagnosis of inflammatory breast cancer. No primary breast mass was seen on MRI.

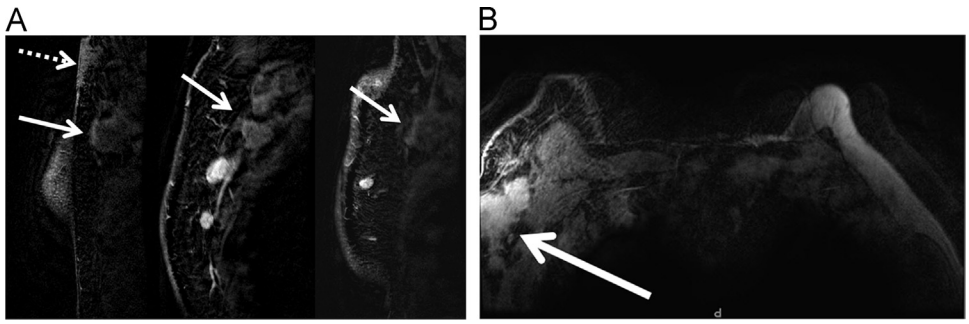

FIG 3. A 65-year-old male with known right breast cancer underwent breast MRI for evaluation of extent of disease. Sagittal T1-weighted post-contrast MRI with fat suppression from lateral to medial of the right axilla (from left to right) (A) and axial T1-weighted fat suppressed post contrast (B) image demonstrate extensive right axillary lymphadenopathy (solid arrows), some of which are necrotic. There is also abnormal skin enhancement (dotted arrow) due to skin involvement by the cancer.

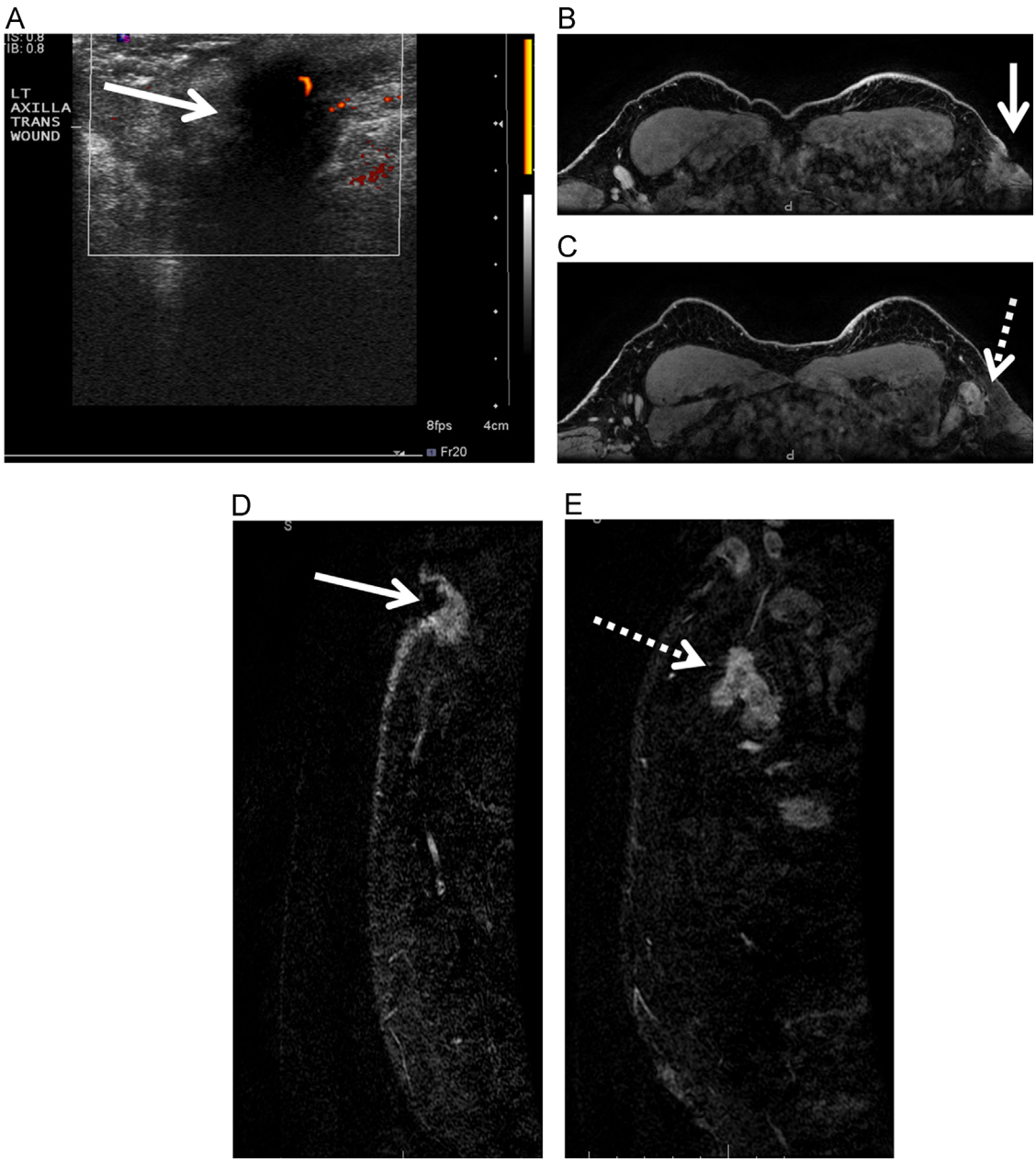

FIG 4. A 55-year-old male patient with a history of moderately differentiated adenocarcinoma involving the dermis and the epidermis with pagetoid extension, presented with an open wound. US with power Doppler imaging (A) in the area of the open wound in the left axilla shows a suspicious irregular, hypoechoic mass with indistinct margins (arrow). Axial postcontrast T1-weighted images with fat suppression (B and C) demonstrate a corresponding irregular mass with spiculated margins and heterogeneous enhancement just deep to the wound (solid arrow) (B). Also noted was extensive left axillary lymphadenopathy and nodal masses with indistinct margins, due to extranodal extension of disease (dotted arrow) (C). Sagittal T1-weighted postcontrast MRI with fat suppression also demonstrates an irregular mass just deep to the wound (solid arrow) (D) as well as extensive left axillary lymphadenopathy and nodal masses (dotted arrow) (E). (Color version of the figure available online.)

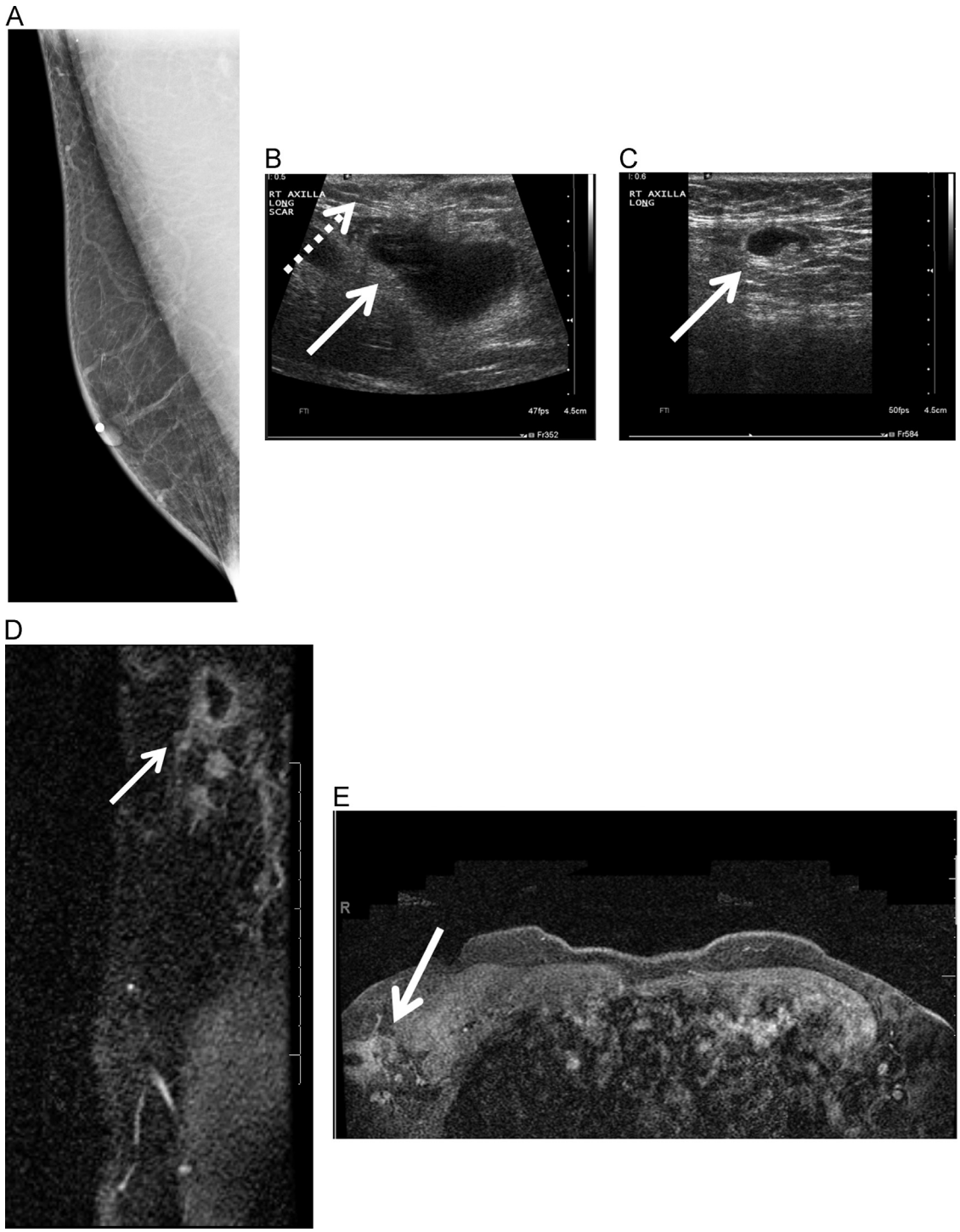

FIG 5. A 66-year-old male status postsurgical excisional biopsy of a right axillary mass yielding infiltrating ductal carcinoma involving the skin and the subcutaneous tissues had positive margins. Right MLO mammogram (A) does not show any abnormalities. The surgical site was out of field of view due to its superior location. US of the surgical site (B) demonstrates a postoperative seroma (solid arrow) and overlying skin thickening (dotted arrow). No suspicious abnormalities were seen. US of the right axilla (C) shows a suspicious lymph node with focal cortical thickening (arrow). FNA of the lymph node was benign. Sagittal and axial postcontrast T1-weighted images with fat supression (D and E) demonstrate enhancing nodular thickening surrounding the postoperative seroma (arrows), corresponding to the positive margins seen at the time of the surgical excisional biopsy.

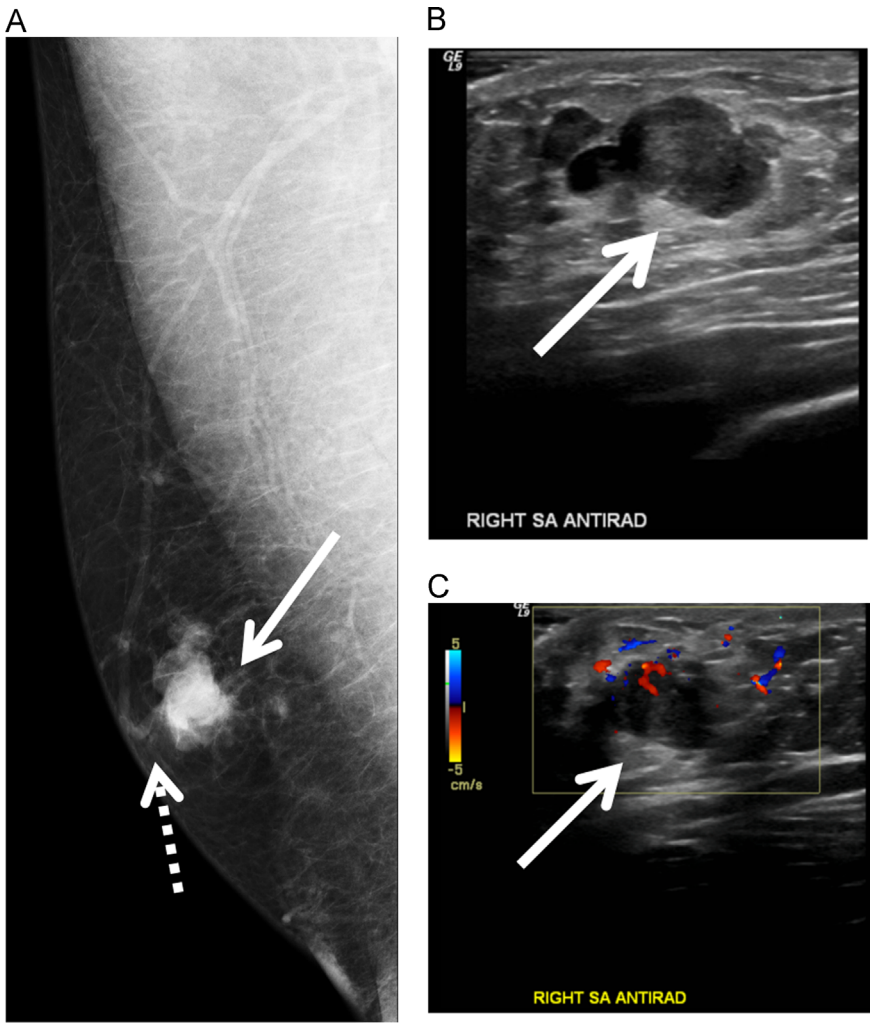

FIG 6. A 31-year-old male presents with a palpable abnormality in the right breast. MLO mammogram (A) shows a high density irregular mass in the right breast (solid arrow) with a clear fat plane between the nipple and the mass (dotted arrow). US (B) demonstrates a corresponding mass (arrow) with vascularity, as seen on color Doppler imaging (C). US-guided biopsy showed invasive ductal carcinoma. The patient subsequently underwent right mastectomy. MLO mammogram (D) shows mild left breast gynecomastia (arrow). Note that there is absence of a fat plane between the gynecomastia and the nipple in contrast to the malignant mass seen in (A). Sagittal and axial postcontrast T1-weighted images with fat supression (E and F) for high-risk screening demonstrate corresponding mild left breast gynecomastia (solid arrows) and postsurgical changes due to the right mastectomy (dotted arrow). (Color version of the figure available online.)

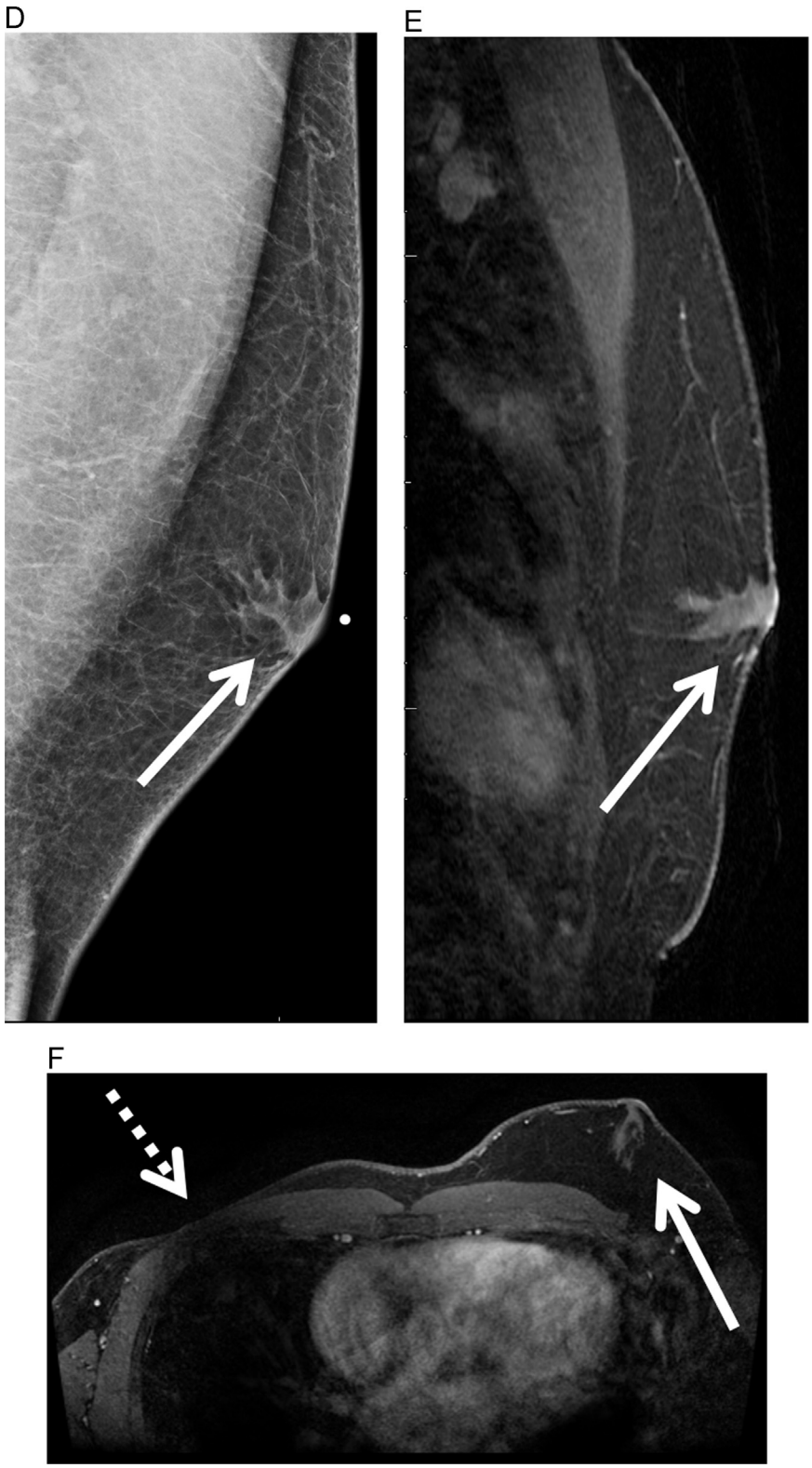

FIG 6. (*continued*)

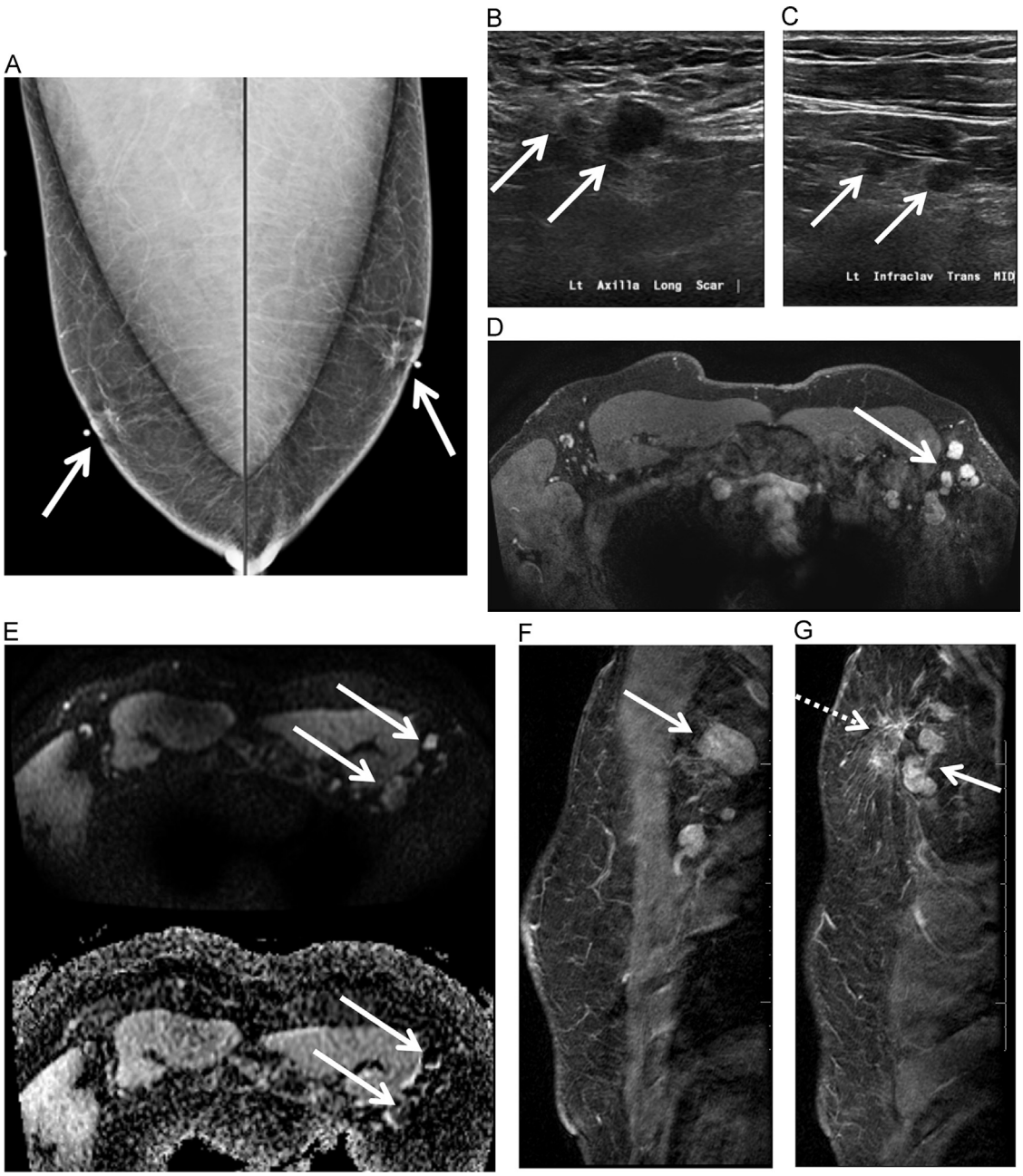

FIG 7. A 46-year-old male with a history of a right axillary mass, status post excision at an outside facility, yielding invasive breast carcinoma. It was unclear whether the mass was a primary lesion or a metastatic lesion. Bilateral MLO mammograms (A) demonstrate no suspicious abnormalities in the breasts. There is symmetric mild bilateral gynecomastia (arrows). US images (B and C) demonstrates multiple suspicious lymph nodes (arrows) in the left level 1 axillary and mid infraclavicular locations with irregular morphology and effacement of the fatty hila. Axial T1-weighted postcontrast image with fat suppression (D) shows multiple suspicious left level 1 axillary lymph nodes with heterogeneous enhancement and effacement of fatty hila (arrow). No other suspicious abnormality was seen to suggest another primary breast lesion. Therefore, the mass that was excised at the outside facility was likely the primary breast malignancy with associated left axillary lymphadenopathy. DWI with corresponding ADC map (E) shows restricted diffusion within the suspicious left axillary lymph nodes (arrows) seen in (B). US-guided fine needle aspiration (FNA) of the most suspicious lymph node yielded metastatic disease. Sagittal T1-weighted postcontrast images with fat suppression (F and G) demonstrate left axillary lymphadenopathy (solid arrows). Architectural distortion anterior to the lymph nodes is consistent with a post-surgical scar (dotted arrow).

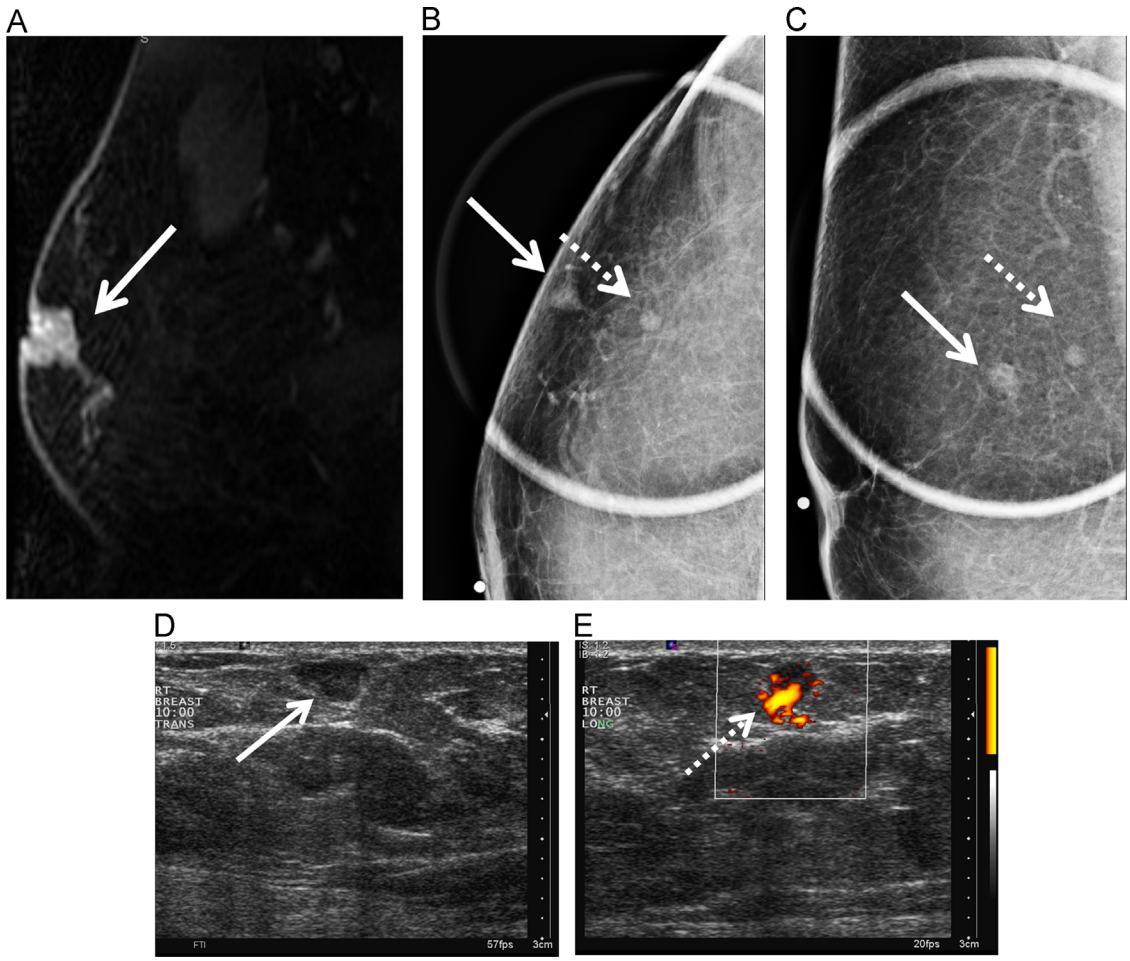

FIG 8. A 71-year-old male with a history of left breast carcinoma, on neoadjuvant chemotherapy. MRI was performed to evaluate treatment response. Sagittal T1-weighted postcontrast fat suppression image of the left breast (A) demonstrates an irregular left subareolar mass (arrows) with associated nipple retraction. Compared to the pretreatment MRI, there was no significant interval change. Subsequently, the patient underwent left mastectomy. The patient returned for a diagnostic mammogram as he had a history of left breast cancer. The patient was 8 years status postleft mastectomy. CC and LM spot compression views of the right breast (B and C) shows a 0.8 cm irregular equal density mass (solid arrow) with indistinct margins in the upper outer quadrant of the right breast at the 10 o'clock position, middle depth. Note that there is also a benign intramammary lymph node posterior to the new mass (dotted arrow). Grey scale US (D) and power Doppler (E) images show a corresponding irregular right breast mass (arrow) at the 10 o'clock position. There is increased vascularity within the mass (dotted arrow). US-guided biopsy showed invasive ductal carcinoma. The patient subsequently underwent right mastectomy. (Color version of the figure available online.)

Evaluation for a primary breast mass in setting of axillary metastasis or mass and negative mammography and US could be an indication for breast MRI in male patients (Fig 7), as well as evaluation of neoadjuvant chemotherapy treatment response in patients with a known diagnosis of a primary breast malignancy (Fig 8). It is noteworthy, however, that evaluation of neoadjuvant chemotherapy treatment response would be sufficient with mammography and US in most male patients.

Conclusion

Breast MRI is not routinely recommended in male patients. However, breast MRI may be helpful and should be considered in a small subset of patients. The decision should be based on clinical necessity or indication.

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