

CLINICAL VIGNETTE

Utility of Breast MRI Compared to Screening Mammography

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Introduction

A sixty-one-year-old female without significant past medical history presents with right breast pain present for 6 months. She has no personal history of breast cancer, but is due for her annual screening, and scheduled for breast mammogram tomosynthesis. The mammogram returns normal but does demonstrate breast density C with a Tyrer-Cuzick risk calculation of 11.5% lifetime risk of breast cancer. Patient is seen again in the office after her normal mammogram, with persistent right breast pain. A diagnostic right breast ultrasound is scheduled and also is resulted as normal. The right breast pain continues, and a breast MRI with and without contrast is scheduled. This demonstrates a heterogeneously and rim-enhancing irregular mass at 8 o'clock, 10cm from the nipple, and another irregular enhancing mass 5.5 cm anterior to the first mass. Breast surgery performs an excisional biopsy, which confirms invasive lobular carcinoma, hormone negative, with no genetic abnormalities.

Discussion

Breast cancer remains the most common cancer among women worldwide, and screening has a critical role in early detection. Mammography has been the gold standard for breast cancer screening, and it is currently recommended annually for women over the age of 40. However, mammography has limitations, particularly in women with dense breast tissue, with potential reduced sensitivity. Dense breast tissue appears white on a mammogram, similar to the appearance of tumors, making detection more difficult and leading to a higher false-negative rate. Studies report that mammography detects approximately 85% of breast cancers in women with fatty breasts, with the detection rate decreasing to 60-70% in women with dense breasts.¹

Breast MRI has emerged as a complementary or alternative tool for breast cancer screening, especially in high-risk populations. These include women with dense breasts, a strong family history of breast cancer, or BRCA mutations. MRI uses magnetic fields and radio waves to create detailed images of the breast, offering superior sensitivity compared to mammography. Several studies have shown that breast MRI can detect cancers that may not be visible on mammograms, particularly in women with dense breast tissue.² A meta-analysis of multiple studies reported that breast MRI has a sensitivity of 90-95% for detecting breast cancers, compared to approximately 85% for mammography.³ This higher sensitivity can be particularly

important in detecting small, early-stage cancers that might otherwise go undetected by mammography.

However, the use of MRI as a screening tool is not without limitations. MRI has a much higher cost compared to mammography, and most insurance companies do not approve this as a screening tool. Breast MRI can also result in more false-positive findings, leading to unnecessary biopsies and increased anxiety. Furthermore, MRI may not be suitable for all women due to contraindications such as presence of metal implants or certain health conditions such as severe claustrophobia. Additionally, the interpretation of breast MRI requires specialized expertise, which may not be readily available in all clinical settings. The American Cancer Society (ACS) and other guidelines recommend breast MRI for women at high risk of breast cancer, such as those with a BRCA1/2 mutation or a strong family history, rather than for the general population.⁴

A study⁵ compared the combined use of mammography and breast MRI for screening in women with dense breasts and reported sensitivity of the two modalities together was significantly higher than mammography alone, detecting 20% more cancers. However, the combined approach also produced increased false positives, and the cost-effectiveness of adding MRI remains a key consideration in clinical decision-making.

Conclusion

Breast MRI offers superior sensitivity compared to mammography, particularly in women with dense breast tissue or those at higher genetic risk for breast cancer. However, the higher rate of false positives, cost, and specialized expertise required to interpret MRI results limit suitability for routine screening in the general population. Current evidence supports the use of breast MRI in conjunction with mammography for high-risk individuals, particularly those with dense breasts, a significant family history, and genetic risk factors. The Tyrer-Cuzick risk calculation should be done with every mammogram to further guide appropriate screening recommendations. Patients with a TC risk of 20% or greater should be screened more closely with yearly MRI, alternating with mammogram at 6 months.

Clinicians should encourage shared decision-making with patients, considering the potential benefits, risks, and cost-effectiveness of adding MRI to their screening regimen. If patients meet any one of the above criteria, breast MRI should

be considered. Further research and advancements in technology may eventually expand the role of breast MRI in routine screening for the general population.

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