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Research Article

Why specially train technicians for MRI Breast- a radiologist's nightmare account.

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Abstract: ***Introduction:*** Breast MRI is an important adjunctive tool for the evaluation of breast pathologies, without incurring the risk of ionizing radiation involved in mammography. Initially, MRI mammography was advised for evaluation of breast implants and their associated complications. However, now there are a varied number of indications for MRI breast. Breast MR imaging does not replace mammography; however, MR imaging is advisable in cases where the diagnosis in unclear after a complete clinical, mammographic, and sonographic evaluation. However, in order to interpret breast MRI, awareness of possible artifacts is essential. MRI of the breasts is prone to a number of artifacts which may be technical or patient related. The more commonly encountered amongst these are motion artifacts, misregistration artefacts, wraparound artifacts, susceptibility artifacts, poor fat saturation, lack of contrast material, and poor timing of the contrast material. Amongst the patient related artefacts; imaging is compromised by improper positioning of the breast tissue located outside the coil. This excluded breast may become folded and compressed, resulting in loss of symmetry. Another fact which is essential and often overlooked includes the acquisition of a sufficient medical history and proper physical examination of the patient.

Keywords: Breast MRI Breast imagingMRI technologists Specialized MRI training Breast MRI protocols

INTRODUCTION

Breast MRI is an important adjunctive tool for the evaluation of breast pathologies, without the risk of ionizing radiation involved in mammography. Initially, breast MRI was advised for the evaluation of breast implants and their complications, but there are now a variety of indications. Breast MRI does not replace mammography; however, it is advisable when the diagnosis remains unclear after a complete clinical, mammographic and sonographic evaluation. To interpret breast MRI, awareness of possible artefacts is essential. Breast MRI is prone to a number of artefacts, which may be technical or patient-related. The more commonly encountered include motion artefacts, misregistration artefacts, wraparound artefacts, susceptibility artefacts, poor fat saturation, lack of contrast material, and poor timing of contrast administration. Among the patient-related artefacts, imaging is compromised by improper positioning of breast tissue outside the coil. The excluded breast may become folded and compressed, resulting in loss of symmetry. Another essential but often overlooked factor is the acquisition of a sufficient medical history and a proper physical examination of the patient.

CASE HISTORY

A 60-year-old woman presented with mild, nagging pain in both breasts for the last 4 months. Physical examination showed no palpable lump, asymmetry between the breasts, nipple retraction, or focal skin lesion or thickening. A mammogram done 4 months earlier was normal. She had no family history of breast or ovarian malignancy.

Imaging Findings

MRI of the breasts showed asymmetry in the shape and size of the two breasts. The left breast was smaller and irregular in contour. The left nipple could not be visualized, suggesting possible nipple retraction, with a focal area of irregular thickening in the left nipple–areolar complex. This abnormal complex showed restricted diffusion on DWI (Figure 1), appeared hypointense on both T1WI and T2WI (Figures 2, 3), and showed post-contrast enhancement. The enhancement persisted on dynamic post-contrast imaging (Figures 4, 5), corresponding to a type I enhancement kinetic curve. No axillary lymphadenopathy was seen.

Otherwise, both breasts showed mixed fibrofatty and fibroglandular parenchyma. The right breast showed no nipple retraction, skin thickening or architectural distortion.

On these findings, a possible BI-RADS category 3/4 lesion was contemplated for reporting. The left breast asymmetry and nipple retraction favoured a possible malignant process (Figure 6), while the type I enhancement kinetics favoured a possible benign aetiology.

However, the MRI findings did not correlate with the clinical examination. The patient was called back and re-examined in the radiology department, and no asymmetry or nipple retraction was found on physical examination.

A repeat breast MRI was performed with special emphasis on the patient's positioning within the breast coil. It was normal, with no abnormality in either breast (Figures 7, 8) and no lesion in the left nipple–areolar complex (Figure 9).

Informed consent was obtained from the patient to use the images of both the initial and the repeat MRI for academic purposes, with complete anonymity of her personal details maintained.

Figures

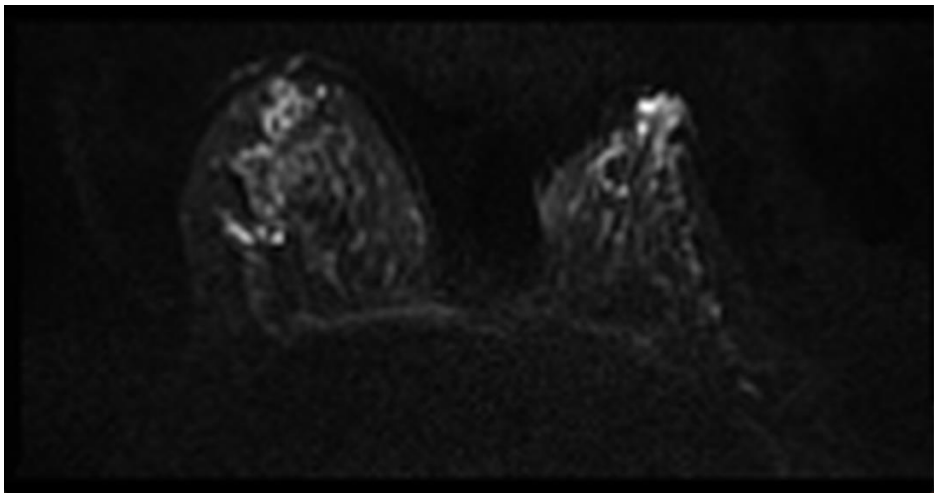


Figure 1. DWI (diffusion-weighted imaging) in the axial plane showing restricted diffusion in the left nipple–areolar complex.

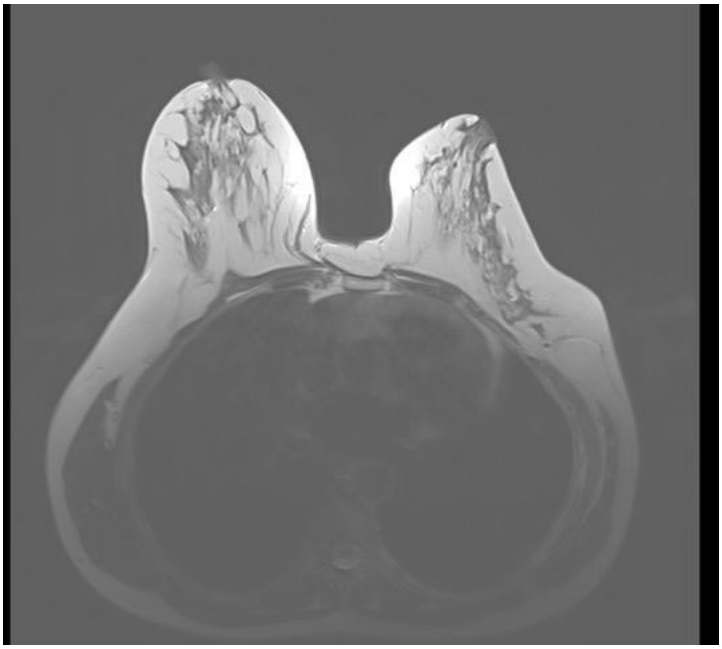


Figure 2. T2WI of both breasts in the axial plane. The right nipple–areolar complex is unremarkable. The left nipple appears retracted, with ill-defined thickening of the nipple–areolar complex.

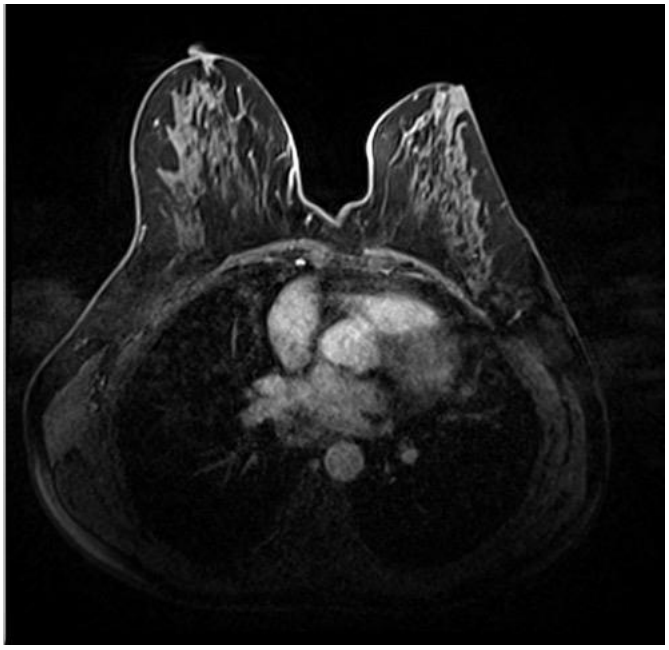
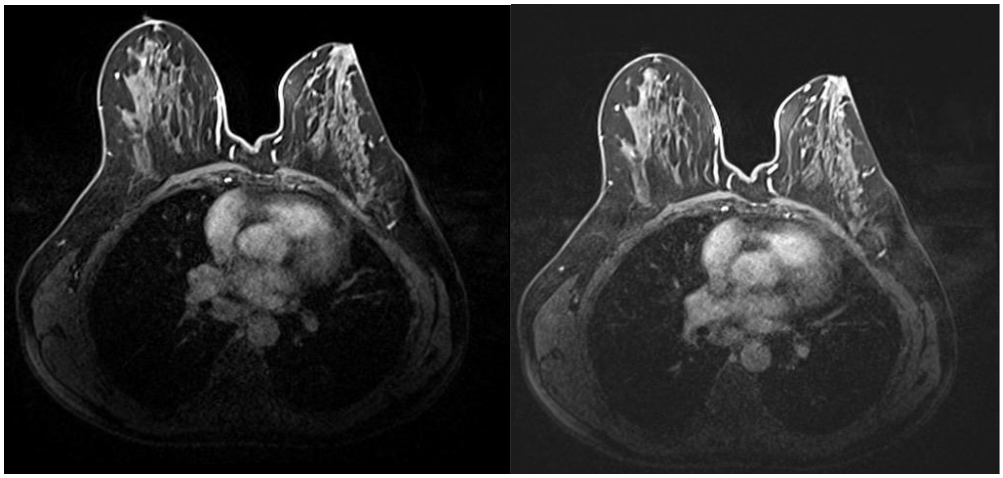


Figure 3. T1WI of both breasts in the axial plane. The right nipple–areolar complex is unremarkable. The left nipple appears retracted, with ill-defined thickening of the nipple–areolar complex.



Figures 4 and 5. Post-contrast T1WI showing enhancement of the left nipple–areolar complex, persisting on both early and delayed images.

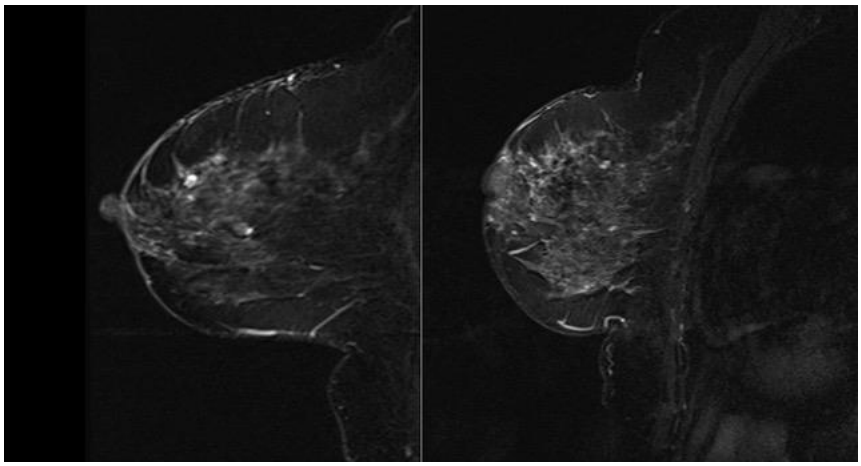
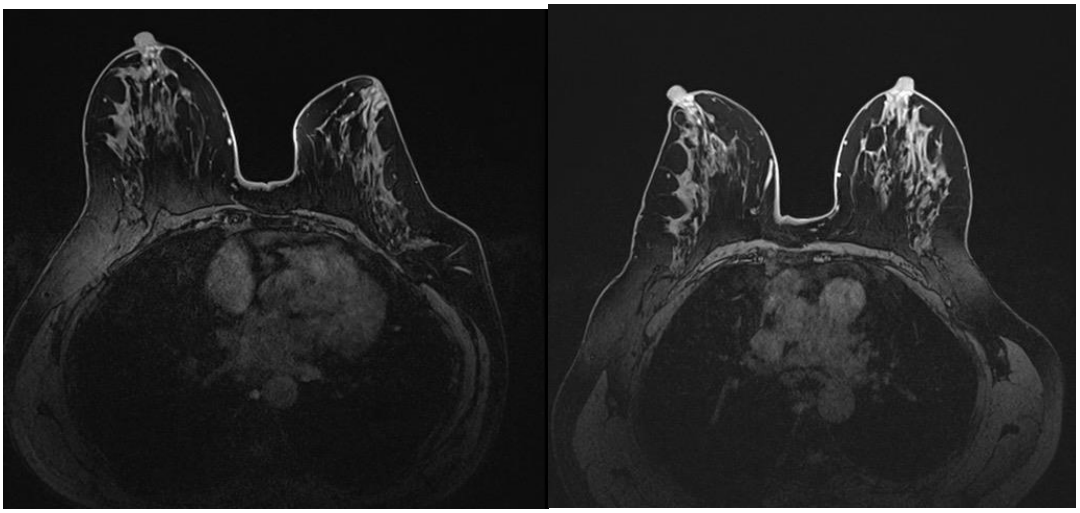


Figure 6. TIRM sagittal images of both breasts. The right nipple–areolar complex is unremarkable. The left nipple appears retracted.



Figures 7 and 8. Axial T1WI in the first study and the repeat study, respectively. No distinct asymmetry, nipple retraction or mass is seen.

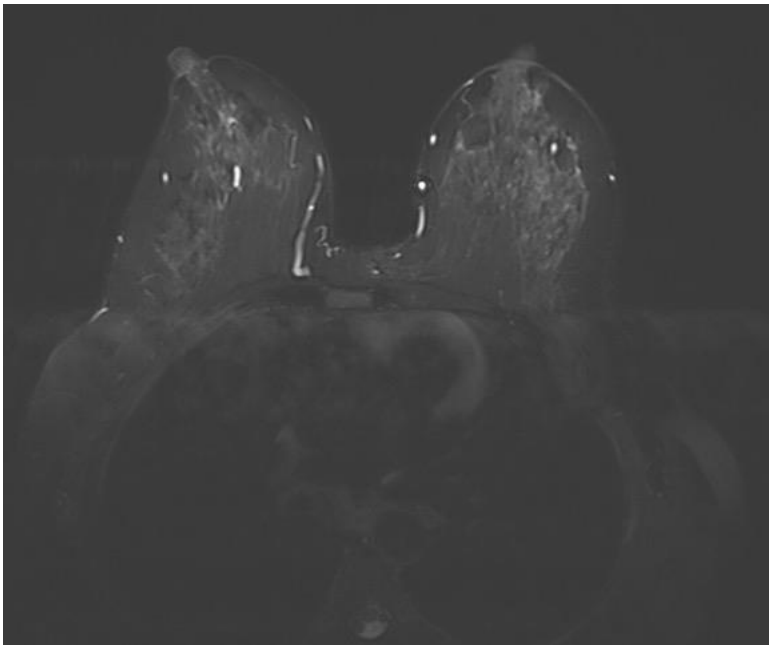


Figure 9. TIRM in the repeat scan, showing normal breasts bilaterally.

DISCUSSION

Breast MRI offers fat-suppressed sequences, high spatial resolution, and post-contrast sequences from which enhancement kinetic curves are derived. The most common indications for breast MRI are to evaluate clinical findings when mammography and ultrasound are negative, to assess a new breast cancer diagnosis, for cancer staging, and to monitor response to chemotherapy (1). Protocols, although similar, vary by geographical region. The United States places more emphasis on morphologic features, requiring high spatial resolution and fat suppression (2), whereas European centres have more commonly emphasized dynamic enhancement characteristics, requiring rapid acquisition of sequences (3).

The reporting team must be aware of the technical factors that can cause breast MRI artefacts, which may degrade image quality and confound interpretation. This case emphasizes the importance of recognizing such artefacts. Artefacts in breast MRI can be grouped into two broad categories: patient-related and technical. The radiologist must also remember that the nipple normally enhances to varying degrees at breast MRI (4). Abnormal nipple enhancement may be due to skin thickening, or to enhancement extending into the areola and periareolar breast tissue from a mass lesion, or it may be an artefact of mispositioning in which the nipple is compressed anteriorly.

A thorough clinical history facilitates interpretation. Pertinent information includes the indication for the study and the prior surgical, family, menstrual-cycle and hormone-use histories. Errors in interpretation can occur

if the relevant clinical and surgical history is not taken into account (5).

In this case, a potential reporting error was averted by a repeat physical examination of the patient. The patient should not be left to position herself in the breast coil. This case also emphasizes that proper training of MRI technicians is essential for breast MRI, particularly regarding patient positioning, and highlights the need for a female assistant in the MRI room. Another option is to have trained female MRI technologists position the breasts evenly within the coil, just as mammographic technologists' position and compress the breasts for mammography.

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