

Unusual Imaging Presentations of Ductal Carcinoma In Situ (DCIS)

A Case-Based Review

Jenny Li¹ BMSc, Jonathan Chung¹ MD, Ilanit Ben Nachum^{1,2} MD, Olga Shmuilovich^{1,2} MD, Giulio Muscedere^{1,2} MD, FRCP(C), Anat Kornecki^{1,2} MD, FRCP(C)

¹Western University, London, Ontario, Canada, ²St Joseph's Health Care, London, Ontario, Canada



DISCLOSURE

- We have no relevant financial or nonfinancial relationships to disclose.

INTRODUCTION

- Breast cancer is the most common malignancy among Canadian women, apart from skin cancer, and the second leading cause of death due to cancer.¹

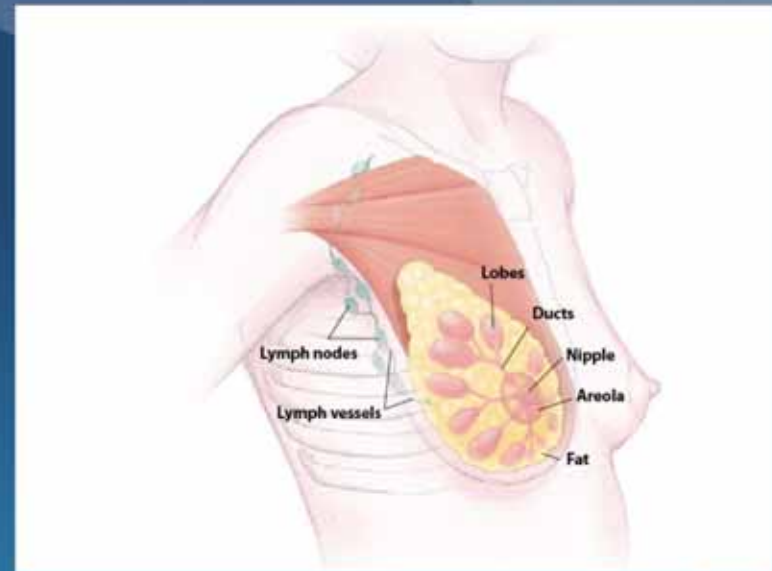


Figure 1. DCIS develops in the breast ducts²

- Ductal carcinoma in situ (DCIS) represents a breast malignancy characterized by proliferation of ductal epithelial cells confined to the breast ducts without evidence of invasion through the basement membrane.³
- It is the most common type of non-invasive breast cancer. Malignancies caught in the DCIS stage carry an excellent prognosis compared to invasive breast cancer.¹

DCIS

- DCIS is classified as Stage 0 breast cancer. Evidence shows DCIS as the direct precursor to invasive forms of breast cancer.⁴
- A current classification of DCIS involves three nuclear grades of lesions (low, intermediate, high) based on the degree of pleomorphic nuclei and frequency of mitoses.³
- Higher grades are associated with worse prognoses.

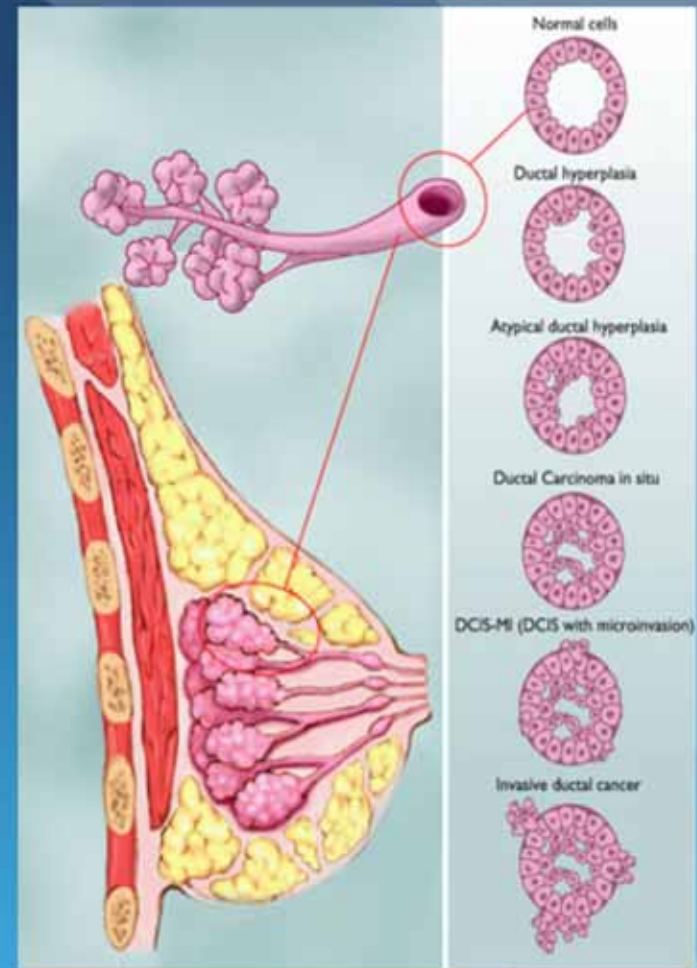


Figure 2. Progression of DCIS to invasive breast cancer⁵

CLINICAL PRESENTATION OF DCIS

- Since DCIS is usually too small to be palpable on clinical breast exam, the advent of mammography screening has led to a dramatic increase in the diagnosis of DCIS.¹
- Before widespread mammography screening, DCIS usually presented as a palpable mass or nipple discharge.^{3,6}
- Symptomatic DCIS has a higher risk of invasive disease at histology compared to screening detected DCIS.⁷

DCIS AND IMAGING

- Mammography is a well-established screening exam for detecting breast cancer and is the most important modality for detecting DCIS.
- More than 90% of cases of DCIS are diagnosed by imaging alone.⁸ Microcalcifications are the most common mammographic finding.³
- Sensitivity of screening mammography for detecting DCIS ranges up to 86%, thus there are many cases of DCIS presenting without microcalcifications.^{9,10}
- The 10 year cancer-related mortality rate after treatment of DCIS is less than 2%. Therefore, early detection of DCIS before progression to invasive cancer is important.¹¹
- The following represents a cohort of teaching cases involving atypical imaging presentations of DCIS. This will better attune breast imagers to the wider spectrum of imaging findings of DCIS.

Begin Cases!

Case 1: DCIS as a Global Asymmetry

History: A 41-year-old female presented with spontaneous left milky nipple discharge.

Physical Exam: Aside from left nipple discharge, the examination was normal.

Imaging: Mammography showed a global asymmetry in the upper left breast that had been stable since 2007.

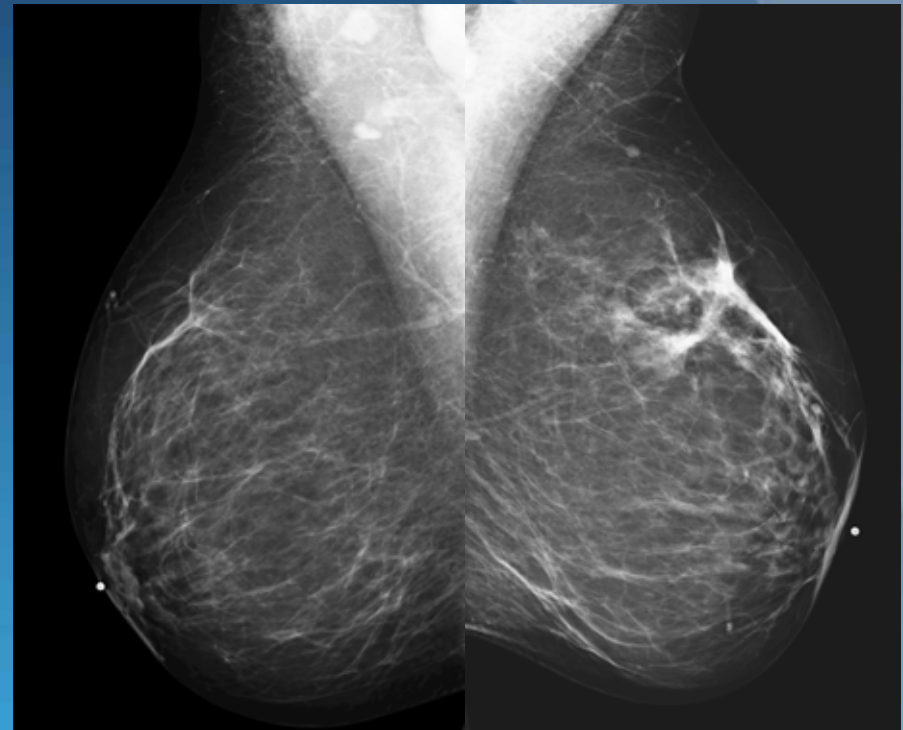


Figure 3. MLO projections of the right (left) and left (right) breasts show a global asymmetry in the upper left breast.

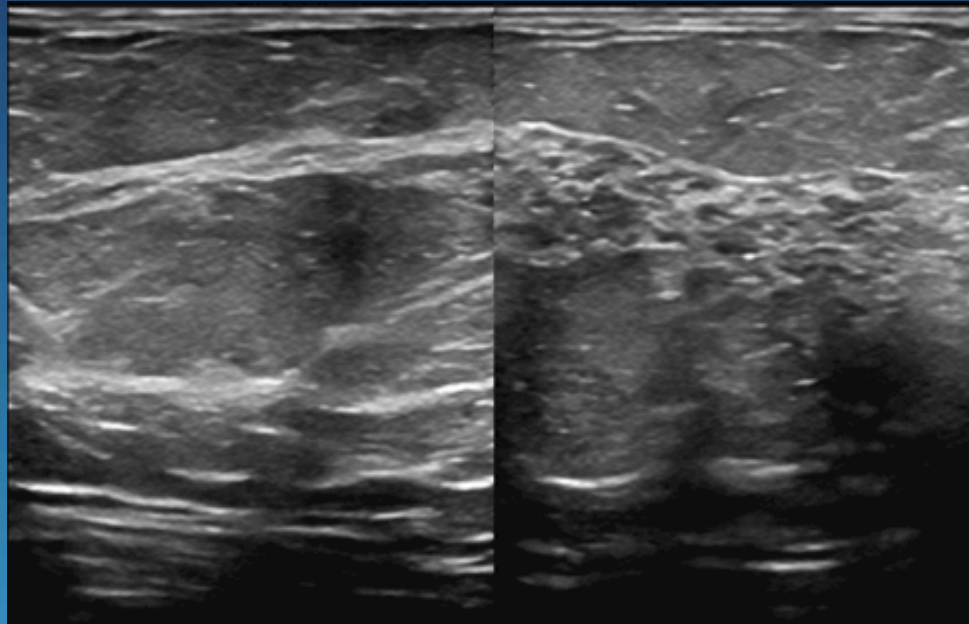


Figure 4. Ultrasound of the left breast (right) shows multiple dilated ducts. A comparison of the right breast (left) is provided.

Pathology: Intermediate-high grade DCIS

Treatment: Left mastectomy with sentinel lymph node dissection and prophylactic right breast mastectomy

In approximately 12% of DCIS cases, architectural distortion and focal asymmetry can be seen on imaging.¹² Breast asymmetries with concerning symptoms should be further investigated, as perceived stability may simply indicate slow growth.

Case 2: DCIS Presenting with Concurrent Chronic Lymphocytic Leukemia

History: A 49-year-old female with a remote history of chronic lymphocytic leukemia (CLL) presented after an episode of mastitis.

Physical Exam: Examination was normal.

Imaging: Mammography showed a persistent left breast asymmetry.



Figure 5. MLO views of the right (left) and left (right) breast demonstrate an asymmetry in the upper left breast that had been stable since 2009.

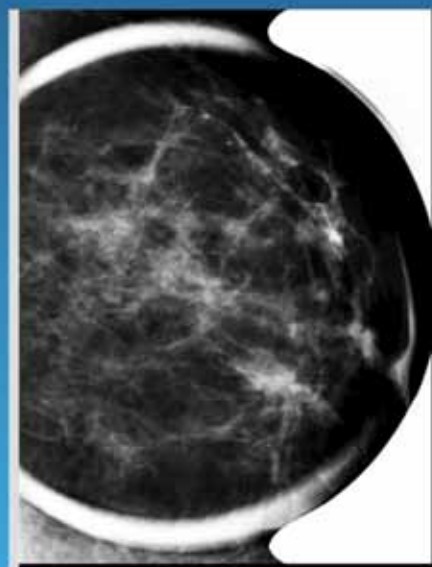


Figure 6. Coned magnification view of the same area shows a persistent asymmetry without concerning calcifications.

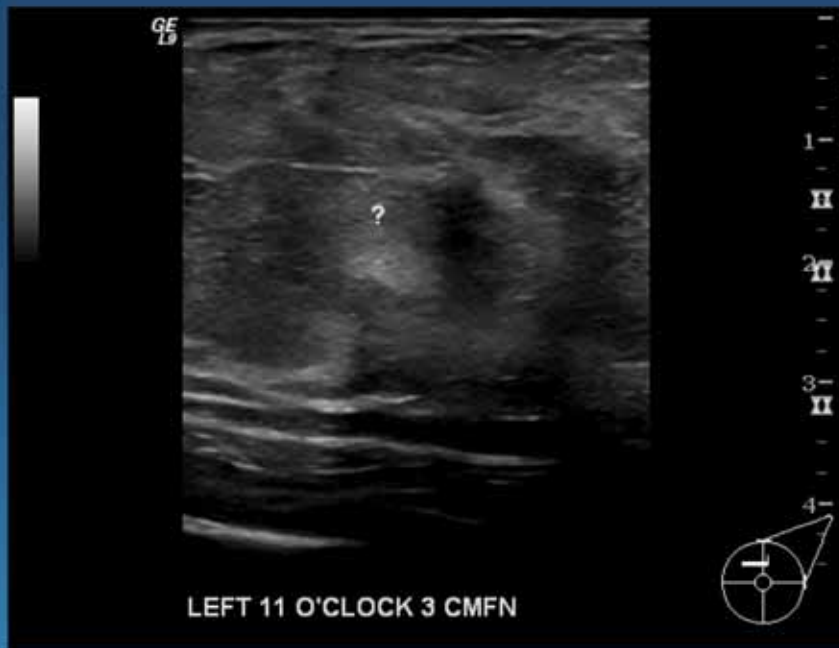


Figure 7. Ultrasound of the same area shows an ill-defined area of distortion with shadowing.

Pathology: High grade DCIS with microinvasion on a background of CLL

Treatment: Left breast lumpectomy followed by re-excision for positive margins

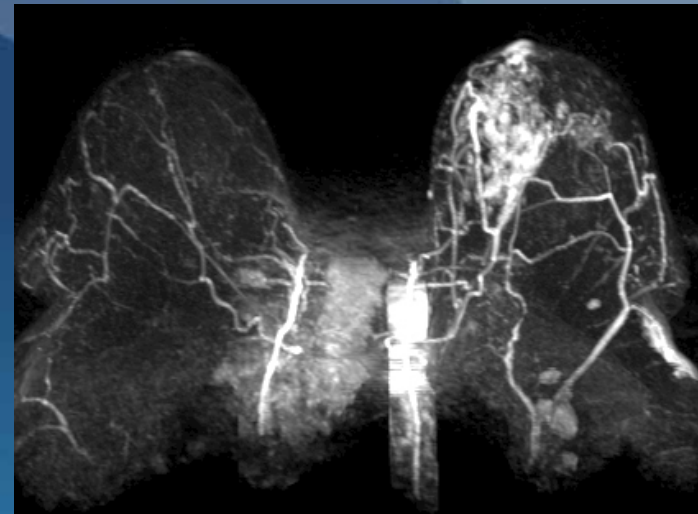


Figure 8. T1-weighted, contrast-enhanced maximum intensity projection (MIP) MRI shows extensive non-mass enhancement in the left breast. It was difficult to distinguish CLL from DCIS.

A concurrent presentation of breast cancer and leukemia is rare.¹³ Typical findings of lymphoproliferative disease of the breast include edema, shadowing, or enlarged intramammary lymph nodes. More subtle changes, however, should not be dismissed and warrant thorough investigation.

Case 3: DCIS with Abnormal Galactogram

History: A 48-year-old female presented with spontaneous bloody left nipple discharge.

Physical Exam: Examination was normal.

Imaging: Mammography showed microcalcifications in the left breast.

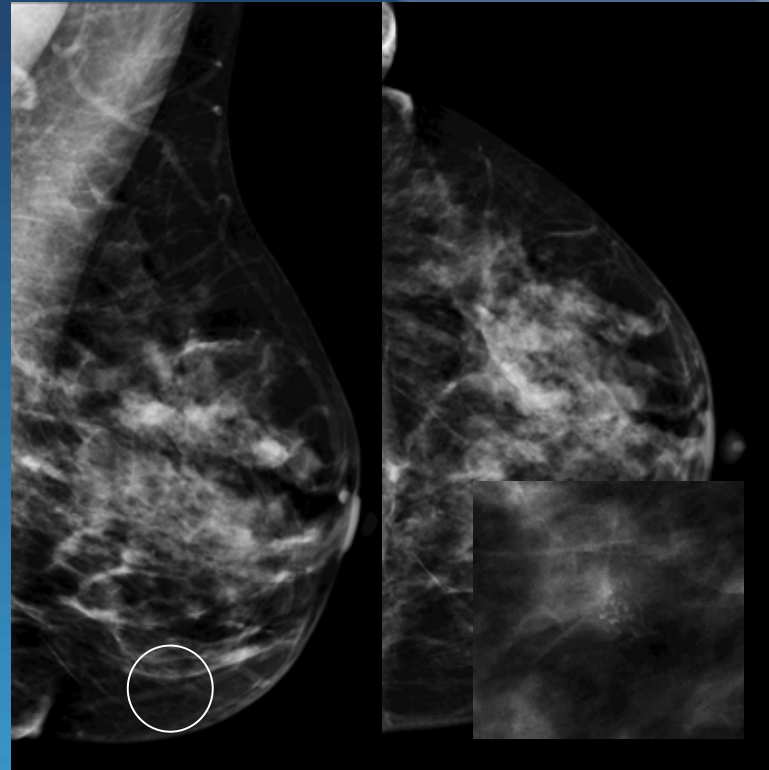


Figure 9. MLO (left) and CC (right) views show an indeterminate cluster of microcalcifications in the lower inner quadrant of the left breast.

DCIS has been shown to present as a galactographic abnormality in up to 7% of cases.¹²

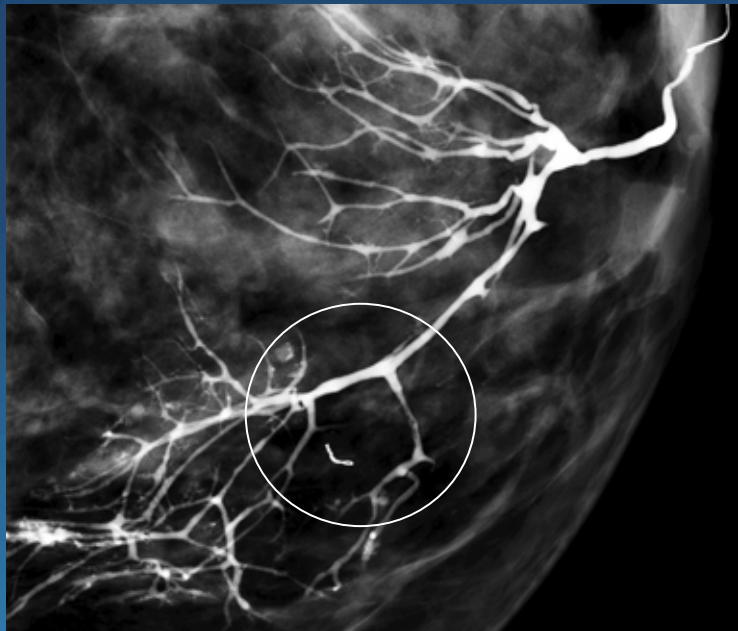


Figure 10. Galactogram in the same patient shows a filling defect in a tertiary duct.

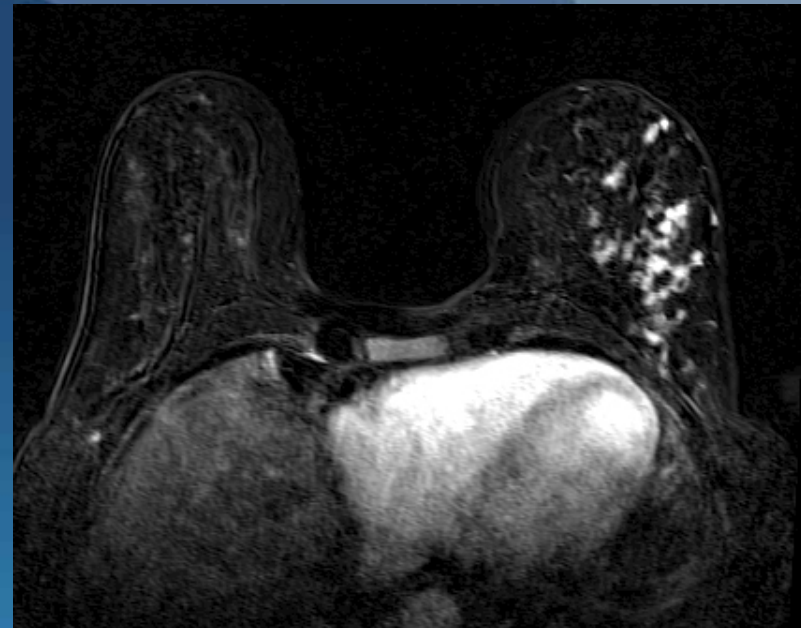


Figure 11. T1-weighted, fat-saturated, gadolinium-enhanced subtraction image shows the true extent of disease in the left breast.

Pathology: Low-intermediate DCIS

Treatment: Bilateral mastectomy with left sentinel lymph node dissection

MRI can be useful in evaluating the full extent of disease, which may not be apparent on other imaging modalities.

Case 4: Mammographically-Occluded DCIS with Positive Ultrasound

History: A 36-year-old female presented with spontaneous bloody nipple discharge and a 1 year history of tenderness and nodularity in the left breast.

Physical Exam: Palpation expressed discharge from the left nipple.

Imaging: Mammography was normal.

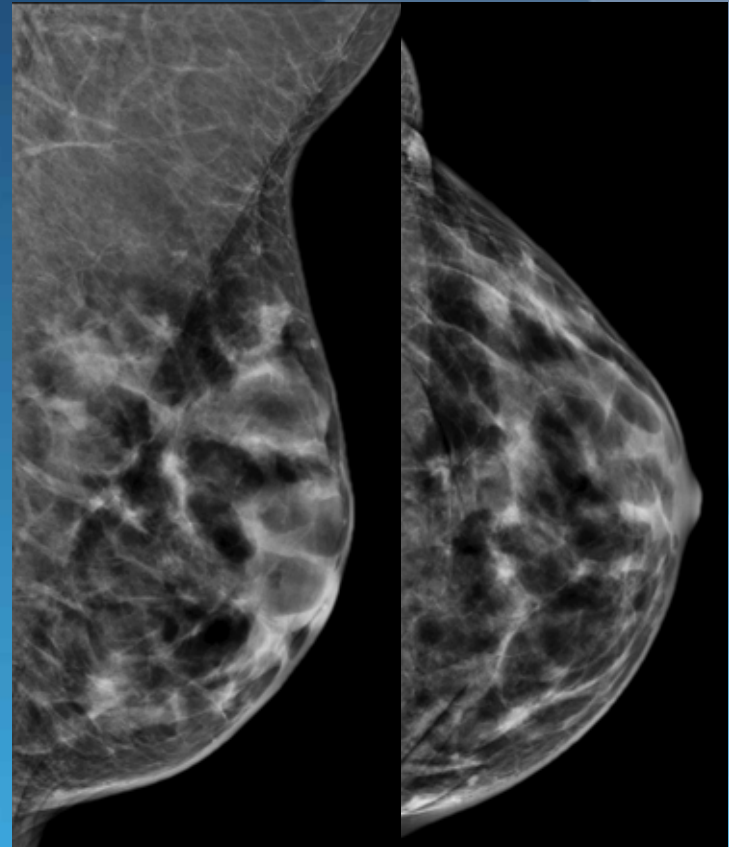


Figure 12. MLO (left) and CC (right) views of the left breast are normal.

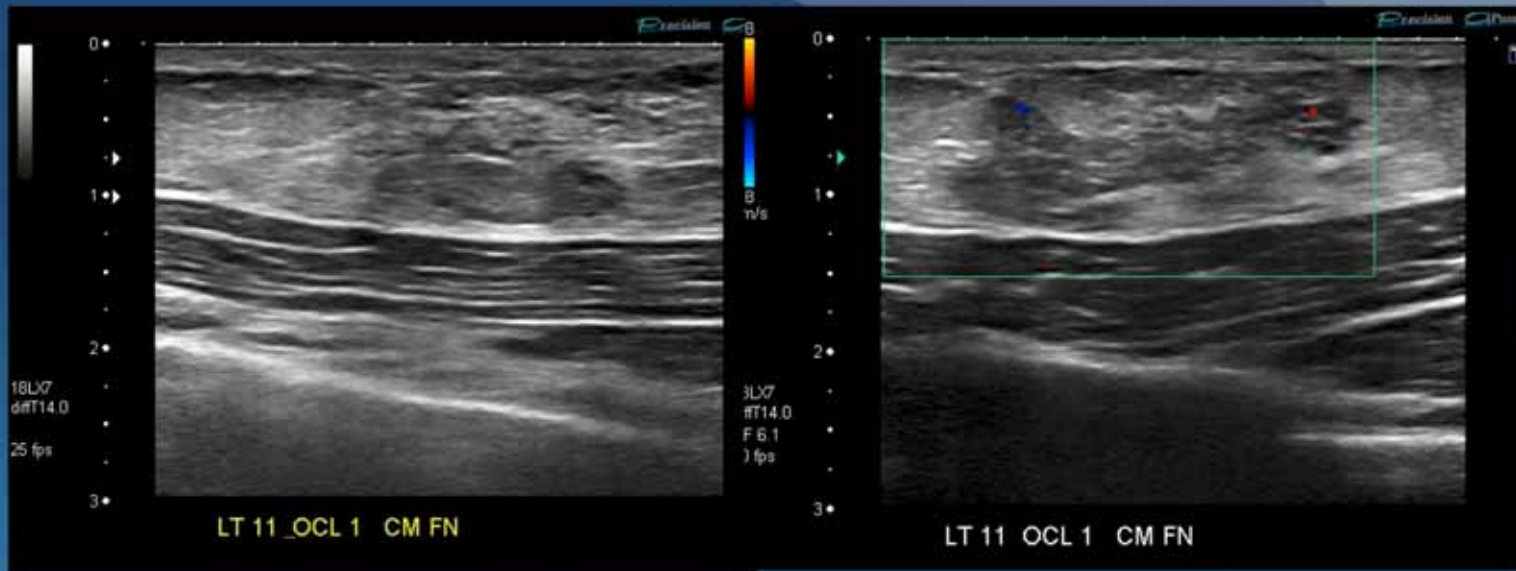


Figure 13. Ultrasound in the same patient shows an area of hypoechogenicity without hypervascularity. Comparative views (not pictured) showed this to be distinctly different from the right breast.

Pathology: Intermediate-high grade DCIS

Treatment: Left breast mastectomy and sentinel lymph node dissection

Ultrasound has been shown to be helpful in the detection of DCIS in patients with dense breasts and DCIS presenting without microcalcifications.¹⁴

Case 5: DCIS Presenting as Paget's Disease

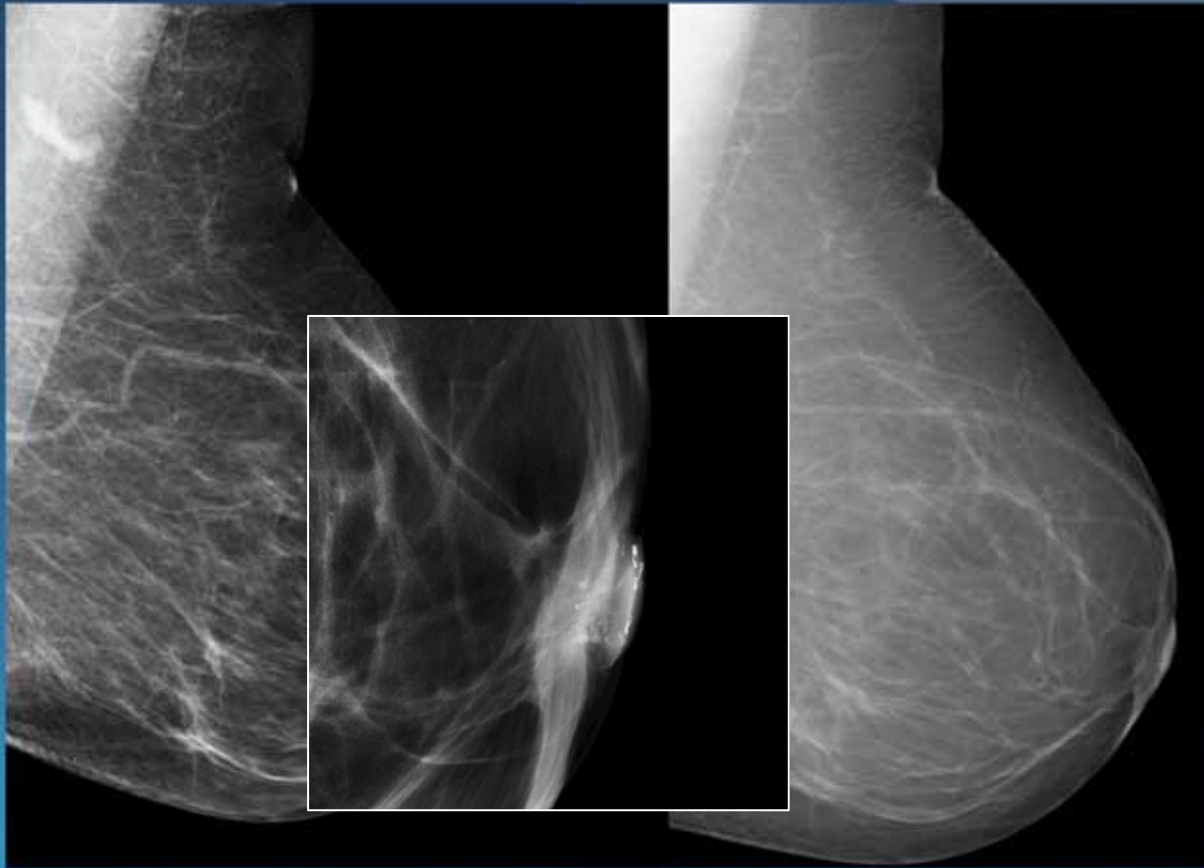
History: A 38-year-old female presented with bloody discharge and skin changes in the left nipple.

Physical Exam: Palpation demonstrated firmness of the left nipple.

Imaging: Ultrasound was initially offered and a retroareolar finding was detected.



Figure 14. Ultrasound shows a spiculated, hypoechoic mass immediately deep to the left nipple.



Pathology:
Intermediate DCIS
with an invasive
component

Treatment: Left
breast central
lumpectomy with left
sentinel lymph node
dissection

Figure 15. Current (left) and prior (right) MLO views of the left breast show interval development of nipple calcifications within a time period of six months. These are better demonstrated on the magnified view (middle).

When an abnormality is initially detected on ultrasound, a mammogram needs to be added to assess the extent of disease.

Case 6: DCIS Mimicking Inflammatory Breast Cancer

History: A 54-year-old female presented with a 1 month history of pain, swelling and redness in the left breast. Inflammatory breast cancer was suspected clinically.

Physical Exam: There was a palpable 5 cm mass with induration, erythema, and redness over the left breast at the 3 o'clock radian.

Imaging: Ultrasound showed a diffuse abnormality in the left breast.

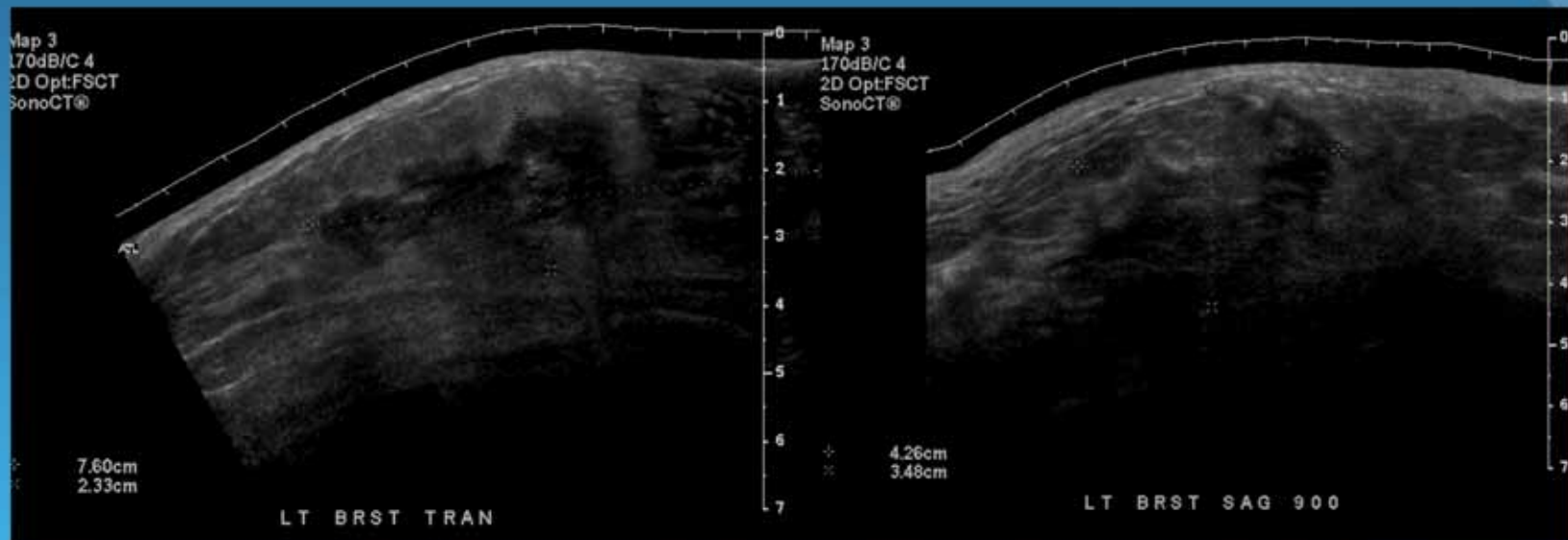


Figure 16. Ultrasound shows diffuse hypoechoogenicity of the left breast with overlying skin thickening.

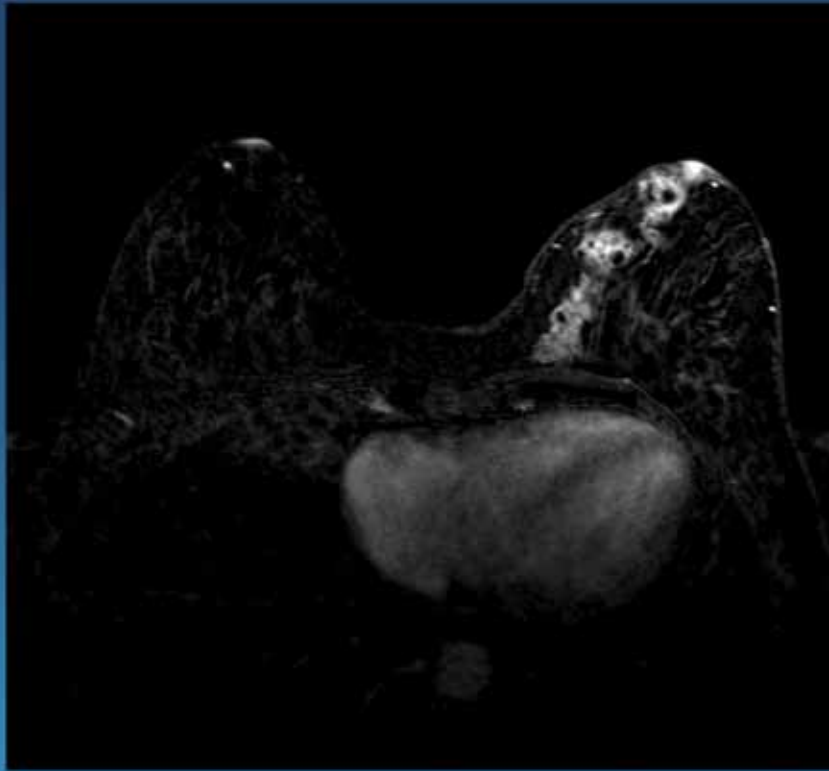


Figure 17. T1-weighted, gadolinium-enhanced subtraction MRI shows diffuse non-mass enhancement of the inner left breast with retraction of the pectoralis muscle and skin thickening.

Pathology: Both ultrasound-guided and skin punch biopsies were performed. Biopsies revealed intermediate DCIS without skin involvement.

Treatment: Left modified radical mastectomy

DCIS can present quite aggressively.
With discordant results, vacuum-assisted biopsy is advised to assess for potential invasive disease.

Case 7: DCIS Presenting Within a Benign Mass

History: An 86-year-old female presented with a 6 month history of a firm mobile mass in the left breast.

Physical Exam: On exam, there was a palpable 3 x 2.5 cm mass in the left breast. The right breast was normal.

Imaging: Mammogram showed a lobulated mass in the left breast.

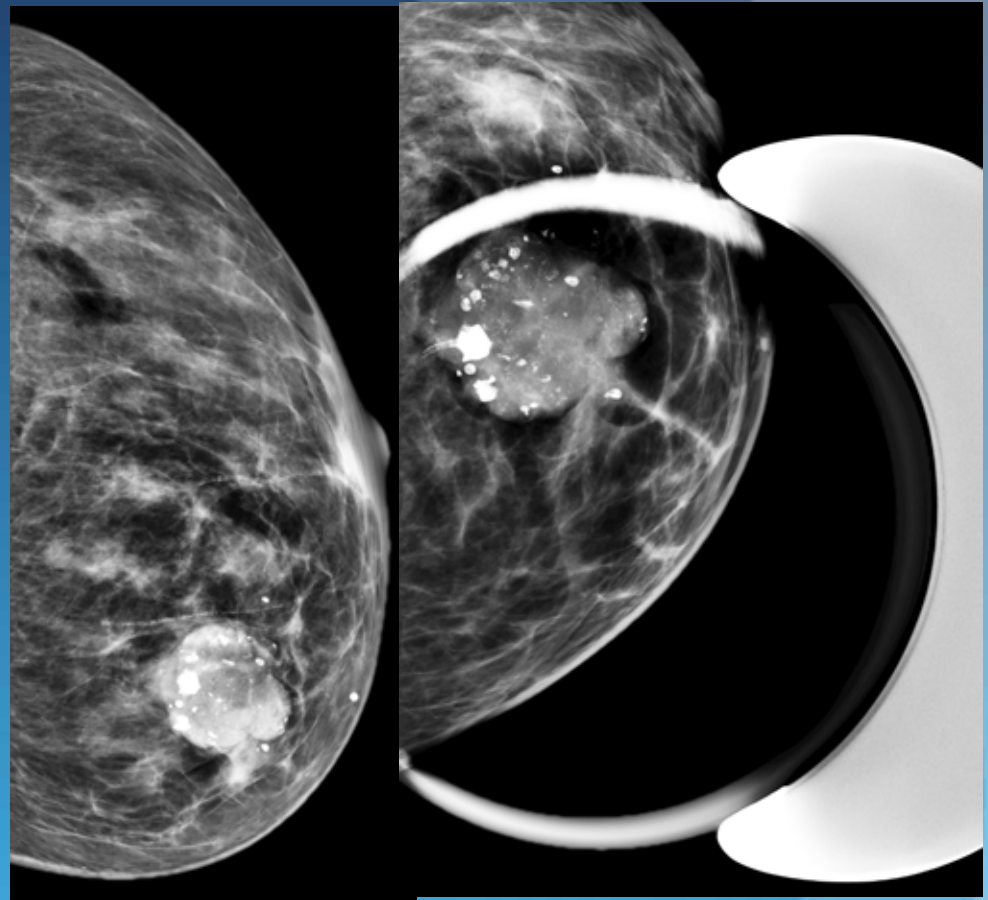


Figure 18. CC view (left) shows a lobulated mass in the inner quadrant of the left breast. Cone magnification view (right) better demonstrates both coarse and fine, amorphous calcifications.



Figure 19. Ultrasound shows a fairly well-defined mass with calcifications in the left breast.

Pathology: High grade DCIS (with an invasive component) within the fibroadenoma

Treatment: Left breast lumpectomy with sentinel lymph node dissection

In 10% of cases, DCIS presents within a mass.³ Developing calcifications within an involuting fibroadenoma must be evaluated carefully. While coarse, “popcorn” calcifications are typical, microcalcifications require further evaluation.

Case 8: Imaging-Occult DCIS

History: A 46-year-old woman presented with a 1 year history of asymmetric fullness in the lower inner quadrant of the left breast.

Physical Exam: Palpation revealed a nodular area in the left lower inner quadrant of the left breast.

Imaging: Mammography showed a focal asymmetry in the left breast, however no abnormality in the right breast.

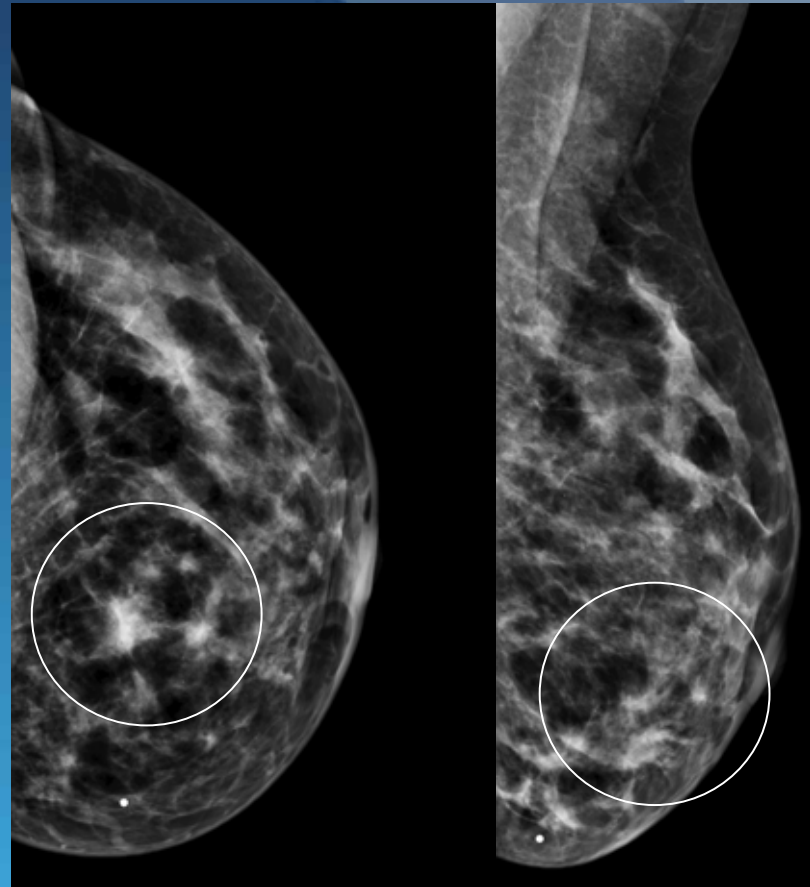


Figure 20. CC (left) and MLO (right) views show a focal asymmetry in the lower inner left breast for which the patient underwent further imaging. The right breast (not pictured) was normal.

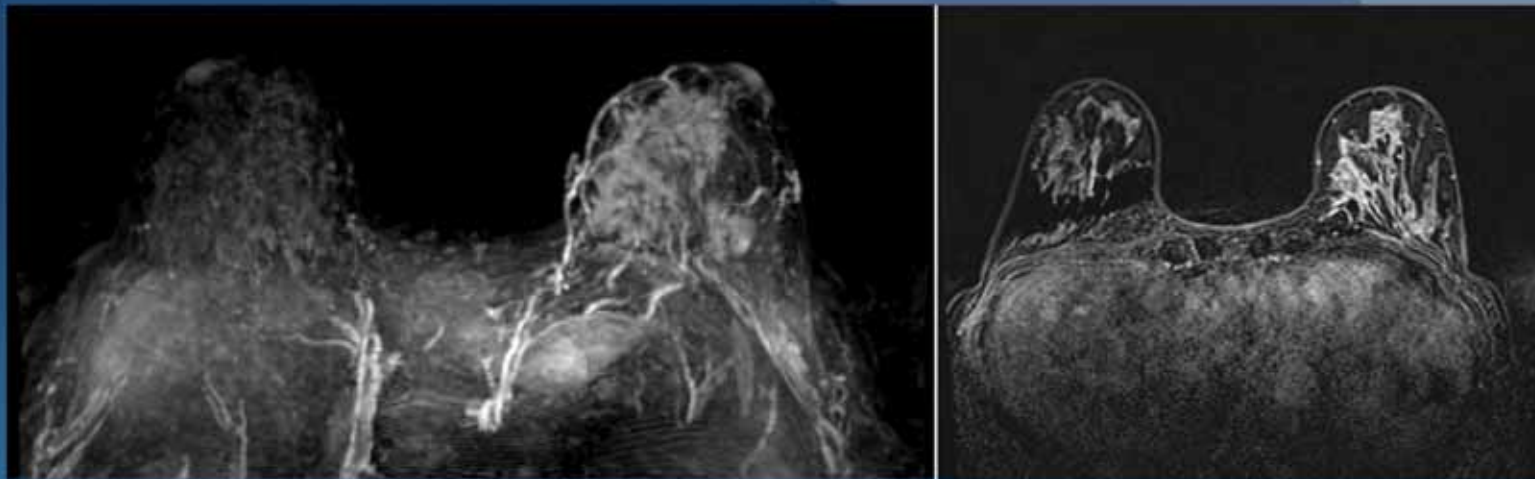


Figure 21. T1-weighted, gadolinium-enhanced MIP (left) and subtraction (right) images show diffuse non-mass enhancement of the entire lower left breast. The right breast is normal.

Treatment: Bilateral mastectomy

Pathology: Invasive mammary carcinoma in the left breast and intermediate grade DCIS in the prophylactically removed right breast

Despite extensive efforts, not all DCIS is captured on imaging. Studies have shown that up to 23% of DCIS lesions are not visible on mammography.^{14,15}

SUMMARY

- The detection of microcalcifications on mammography is the most common presentation of DCIS.
- Careful attention must be paid to all images. Subtle changes may include, but are not limited to, asymmetry, torturous ducts, fine nipple calcifications, and developing calcifications within pre-existing benign lesions.
- MRI can be a helpful tool in the assessment disease extensiveness.
- Always remember: Imaging-occult DCIS may present incidentally!

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