

Background

Since the majority of breast pathology primarily focuses on breast cancer, little emphasis is placed on how systemic illness can affect the breast.

Women exhibiting breast manifestations of systematic disease may present with varying symptoms mimicking cancer. It is important for radiologists to have an awareness of other diseases which can affect the breast.

Learning Objectives

Summary of key features including background (BG), pathology, clinical signs & imaging features for each disease type covering :

- endocrine
- vascular
- systemic inflammatory
- infectious
- haematologic diseases

Imaging Findings

Endocrine

Diabetic Mastopathy

BG: An uncommon disease process, equally as prevalent in men and women, strongly associated with long standing IDDM.

Path: Hyperglycaemic states can cause increased collagen production & decreased degradation, resulting in focal extracellular matrix expansion giving rise to dense tissue.

Signs: Palpable breast mass one or more, non-tender, solitary, uni- or bilateral, can be retroareolar.

Imaging: Mammo - dense tissue, mass with asymmetric density or architectural distortion with features suggestive of malignancy.

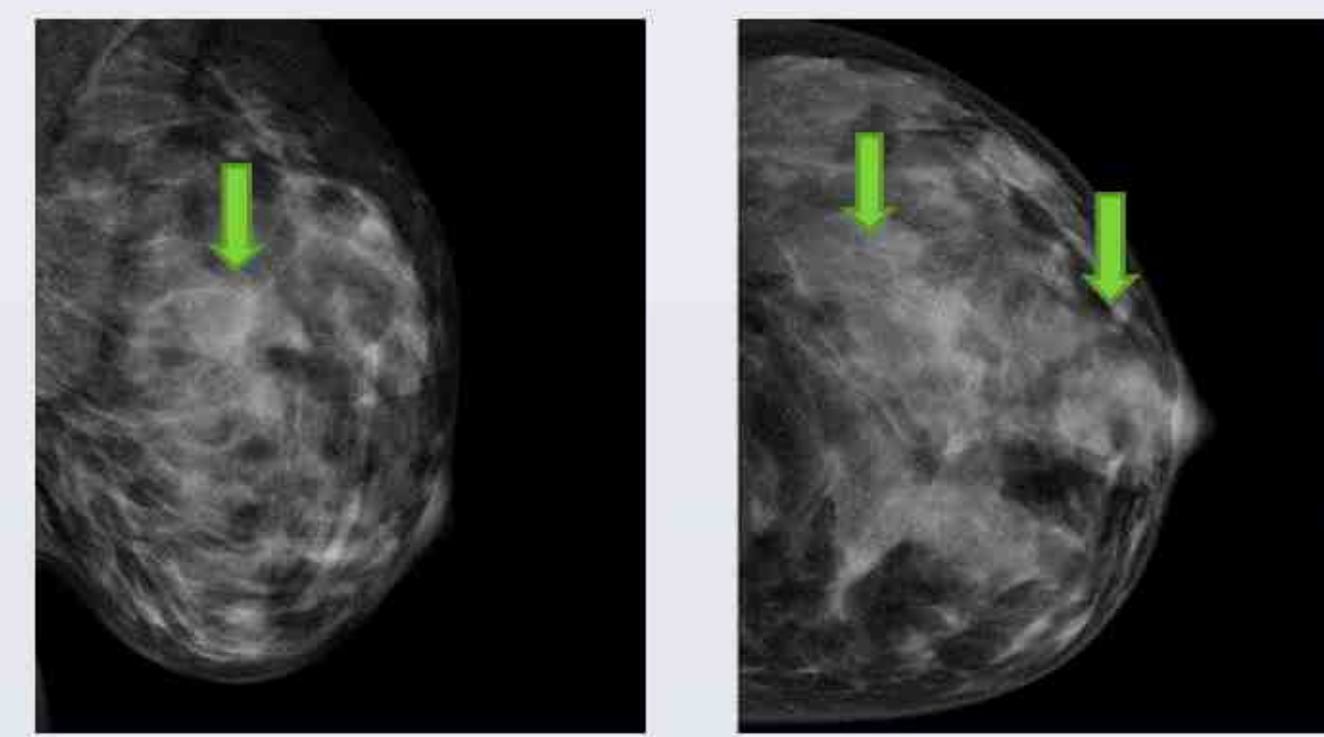


Fig 1. Mammogram MLO and CC views (right) showing dense tissue and mass like areas in diabetic mastopathy

Cardiovascular disease

BG: Affects almost every organ including breast, often found on concurrent imaging.

Signs: Background linear venous calcification. Venous engorgement and oedema.

Imaging: Mammo - skin thickening, increased density and arterial calcification longitudinally along the periphery as two straight parallel calcium deposits. US- venous engorgement and hypoechoic changes mimicking mass.

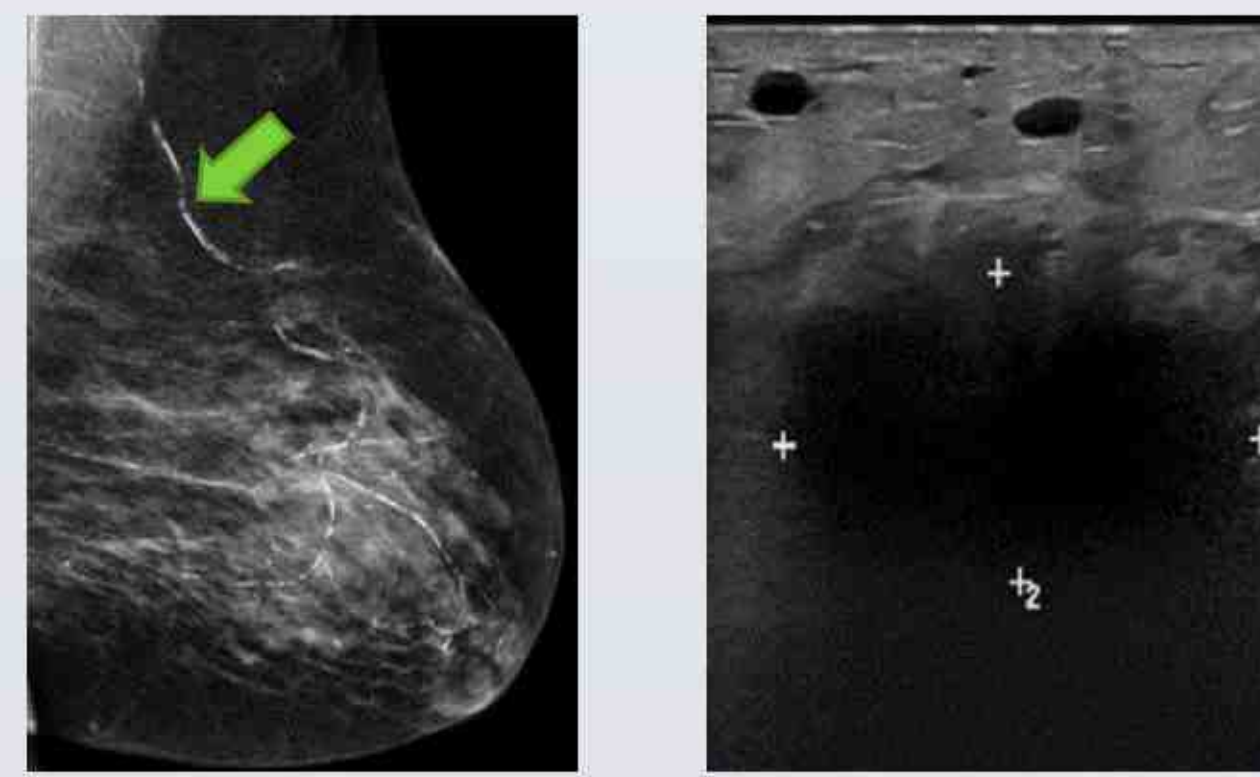


Fig 2. Mammogram MLO showing linear vascular calcification. US shows a hypoechoic mass, oedema & engorged vessels superficially in a woman with CV disease

Infectious disease

Tuberculosis mastitis

BG: TB mastitis is very rare. Most common path of infection is retrograde spread from infected lymph nodes or direct extension from contiguous structures. Important to differentiate TB mastitis from granulomatous as steroid treatment for granulomatous mastitis causes a flare of TB.

Signs: Hard, painless, poorly defined mass, associated skin/nipple retraction. Axillary node involvement, fistulation/sinus tracts.

Imaging: Mammo - 3 distinct patterns: NODULAR-well-circumscribed; DIFFUSE-multiple foci with sinus tract & skin thickening; mimics inflammatory breast ca; SCLEROSING -extensive fibrosis also mimics carcinoma.

US-can be a cystic or solid mass
MRI - enhancing heterogeneous mass

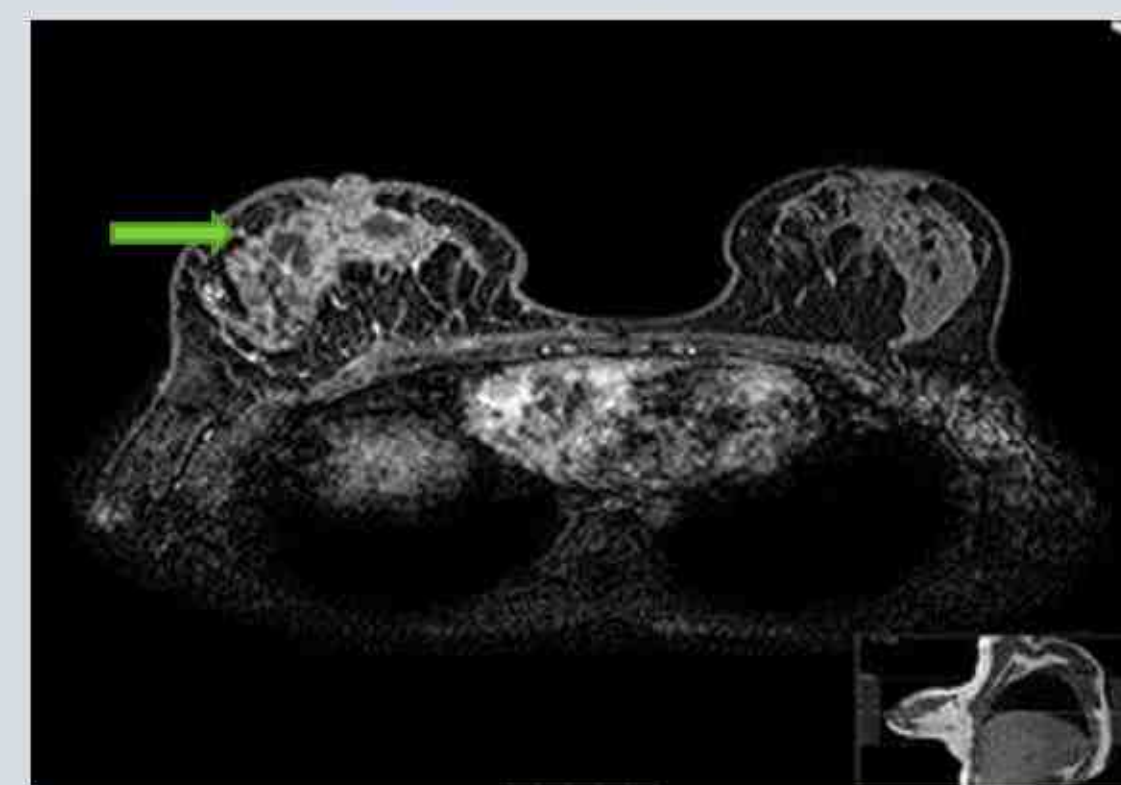


Fig 3. (Right) Axial MRI demonstrates an ill defined enhancing mass within the right breast (arrow) found to be TB mastitis on sampling.

Systemic Inflammatory diseases

Granulomatous mastitis

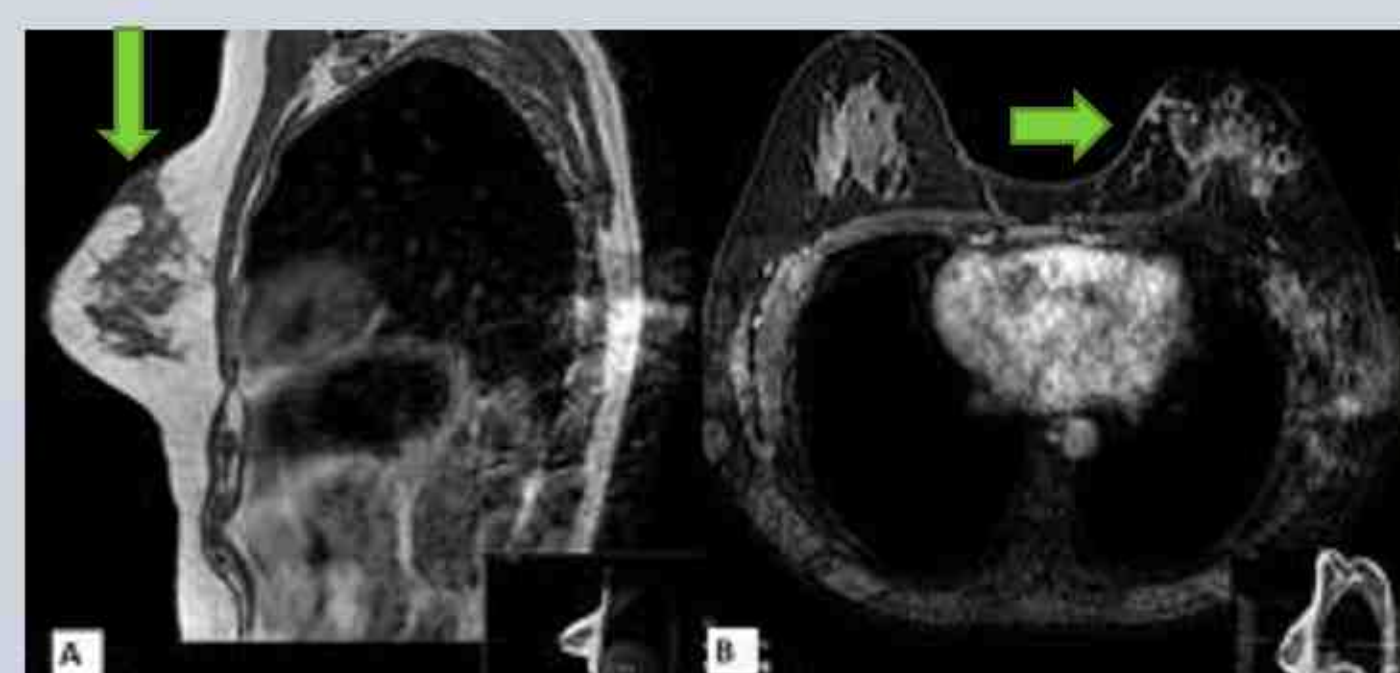


Fig 4. (Left) MRI of granulomatous mastitis A) sagittal T1 and B) contrast axial T1 subtraction. A) shows sinus tract formation to the skin superiorly within the left breast. B) shows multiple ring enhancing lesion in the left breast.

BG: Seen in women of childbearing age and responds well to steroids.

Signs: Tender palpable nodules, nipple inversion, skin thickening, sinus tracts, uni- or bilateral.

Imaging: Mammo: normal, masses, focal asymmetric density, dilated retroareolar ducts, later stage tubular and spherical calcifications with lucent centre.

US: multiple clustered hypoechoic retroareolar tubular structures, hypoechoic granulomas or cystic areas.

MRI: multiple ring enhancing lesions (type 2/3 enhancement pattern), sinus formation.

Systemic Inflammatory disease cont.

Sarcoidosis

BG/path: a multi system disorder, characterised by the pathological noncaseating granulomas which alter the functionality of the affected organ. Breast involvement is rare & usually associated with pre-existing disease.

Signs: mass or intramammary lymph nodes.

Imaging: Mammo - Irregular, ill-defined or spiculated masses (granuloma) which mimic carcinoma. Occasionally breast sarcoid may present as well-defined masses that represent intramammary lymph node involvement.

US - Well defined hypoechoic granulomas mimic carcinoma requiring core biopsy

NB: Surgical excision is rarely an option since granulomas form around scar tissue. Medical management usually 1st line.



Fig 5: US showing a well defined hypoechoic mass proven to be a sarcoid granuloma

Scleroderma

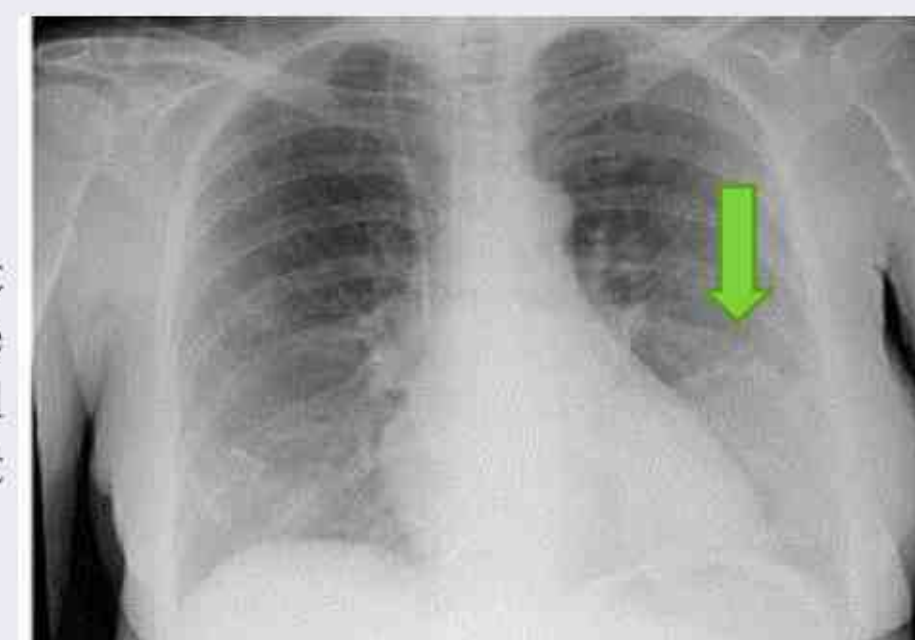


Fig. 6 (right) chest radiograph with coarse calcification projected over the left breast shadow /chest wall

MRI - replacement of the subcutaneous and breast fat by low signal, non-enhancing tissue.

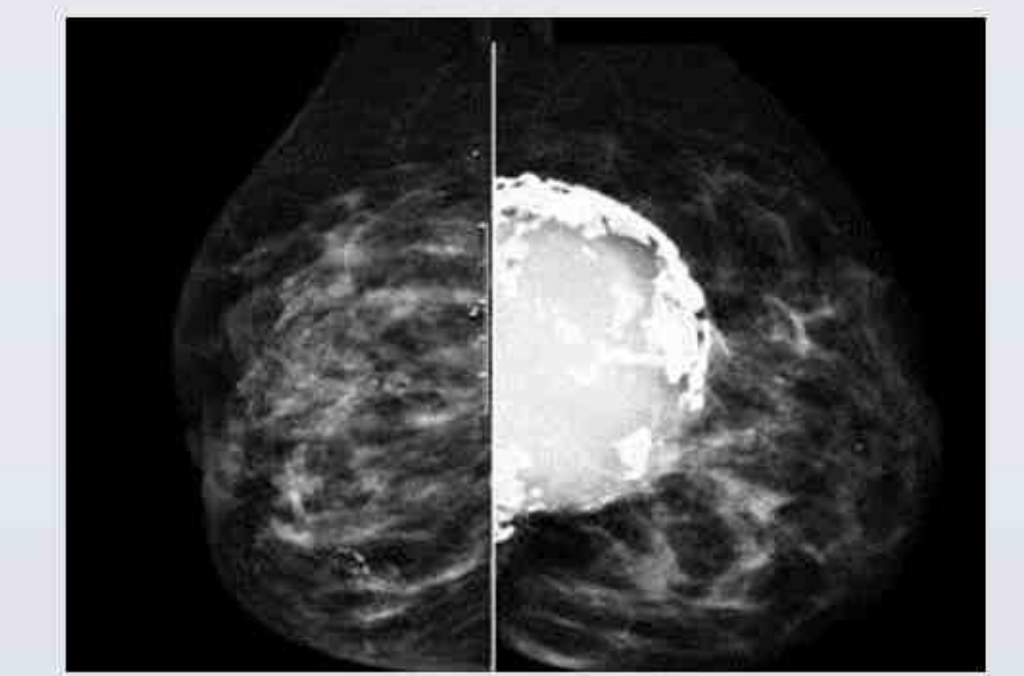


Fig 6 & 7. CT and mammo in a patient with scleroderma shows coarse dystrophic calcification within the breasts.

BG/path: connective tissue disorder that produces sclerosis of the skin. Aetiology is unknown; has been reported in patients with breast cancer treated with radiation therapy and after silicone breast implantation.

Signs: Erythema, retracted and indurated skin. Skin tightening (face, fingers), Ca²⁺ deposits, patulous oesophagus, pulmonary fibrosis (NSIP pattern). Diagnosis confirmed histologically.

Imaging: Mammo- coarse ca²⁺ in breast tissue.



Haematological disease

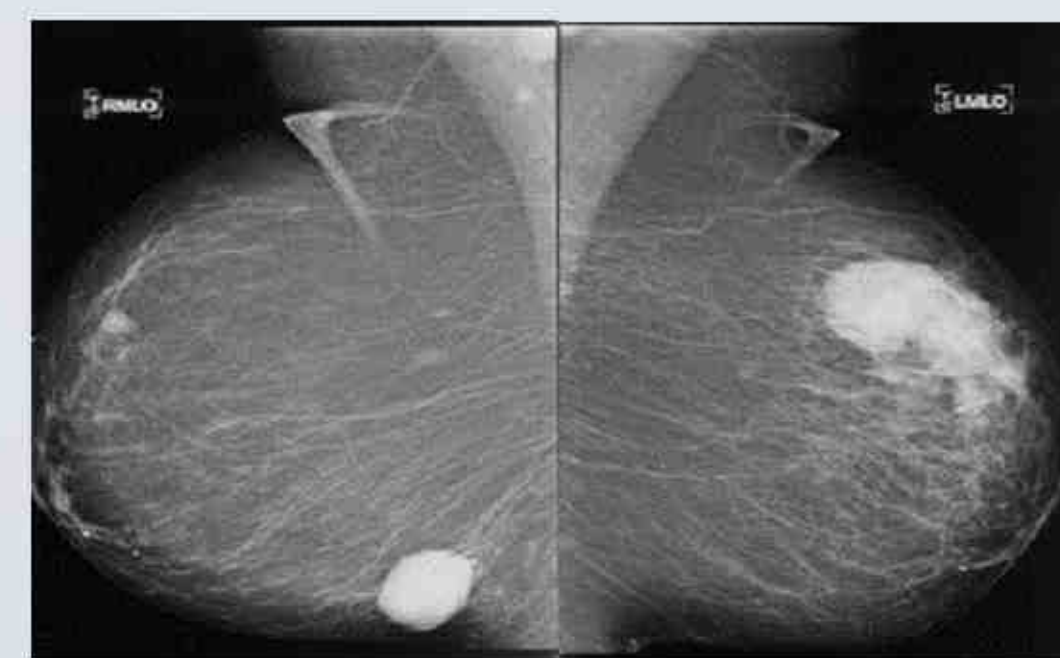


Fig 8. (above) Mammograms showing well defined mass on right and ill defined mass on left; on biopsy found to be lymphoma

Lymphoma

BG: Lymphoproliferative disorders rarely involve the breast and manifest commonly as a primary lesions or part of a generalised process. It can occur in all with median age of 50 yrs.

Signs: Uni- or bilateral palpable breast mass, pain, night sweats, fever, weight loss.

Imaging: Mammogram - circumscribed mass, focal or diffuse densities, or discrete nodules with irregular margins, no calcification

US: irregular bizarre hypoechoic mass, single or multiple, uni- or bilateral. Enlarged intramammary and axillary lymph nodes.

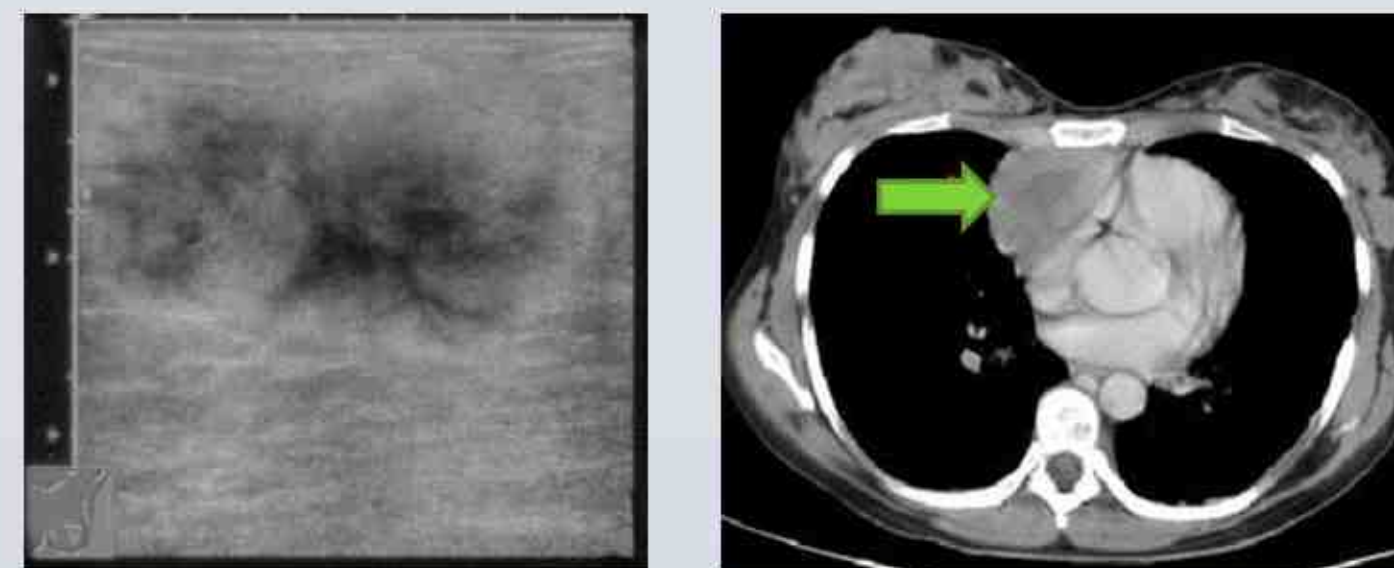


Fig 9. (far left) US showing an ill defined hypoechoic mass found to be lymphoma. Fig 10. (left) Axial CT of the same patient showing a right anterior mediastinal nodal mass.

Conclusion

Radiological features of systemic disease in the breast may mimic those of malignancy causing a diagnostic challenge even if the underlying disease is known.

After excluding primary breast malignancy or benign pathology, evaluation for systemic disease should be considered.

It is important for breast radiologists to have an understanding of other diseases giving rise to breast manifestations.

Systemic Disease	Imaging characteristics
Diabetic Mastopathy	Ill-defined hypoechoic mass which mimics carcinoma and asymmetric densities
Cardiovascular disease	Skin thickening, vascular engorgement, linear arterial calcifications, increased parenchymal density and oedema
Tuberculous Mastitis	Nodular, diffuse or sclerosing patterns, ring enhancing lesion, sinus tract or fistulation, systemically unwell
Granulomatous Mastitis	Masses, hypoechoic granulomas, sinus formation, lymphadenopathy
Sarcoidosis	Irregular spiculated mass/granulomas, intra mammary lymph nodes
Scleroderma	Coarse dystrophic calcification with skin thickening
Lymphoma	Uni- or bilateral, single or multi focal mass, bizarre hypoechoic lesion on US, lymphadenopathy

References and Acknowledgments

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