BMJ Best Practice

Assessment of breast mass

Straight to the point of care

Last updated: Jun 10, 2025

Table of Contents

Summary

Breast masses are a common clinical finding. The majority of palpable breast masses are benign, but 10% of women who present with this finding will have a diagnosis of cancer.[1] Approximately 4% of breast cancers will present with a palpable mass and no mammographic or ultrasonographic evidence of disease.[2]

A delayed or missed breast cancer diagnosis can severely affect patient outcome.

Evaluation of a breast mass is guided by findings on history, physical examination, imaging, and biopsy.[3] A triple test of clinical breast examination, imaging (e.g., mammography and ultrasonography), and needle biopsy can lead to a definitive diagnosis in nearly all cases.[4] [5] [6]

Aetiology

Breast cancer most often involves the glandular breast cells in the ducts or lobules. Men with breast cancer tend to present later than women; symptoms and diagnosis are the same.[7] [8]

Benign breast masses

Fibroadenoma

The most common cause of breast mass. Fibroadenomas occur more commonly during the early reproductive years. Autopsy studies reveal these lesions in 9% to 10% of all women.[9] The exact cause of fibroadenomas is unknown, but their development is thought to be hormonally related.[10] Although these are benign lesions, some studies suggest that women diagnosed with fibroadenoma have approximately twice the risk of developing breast cancer relative to women without the lesions.[11] However, this is not supported by more recent data.[12]

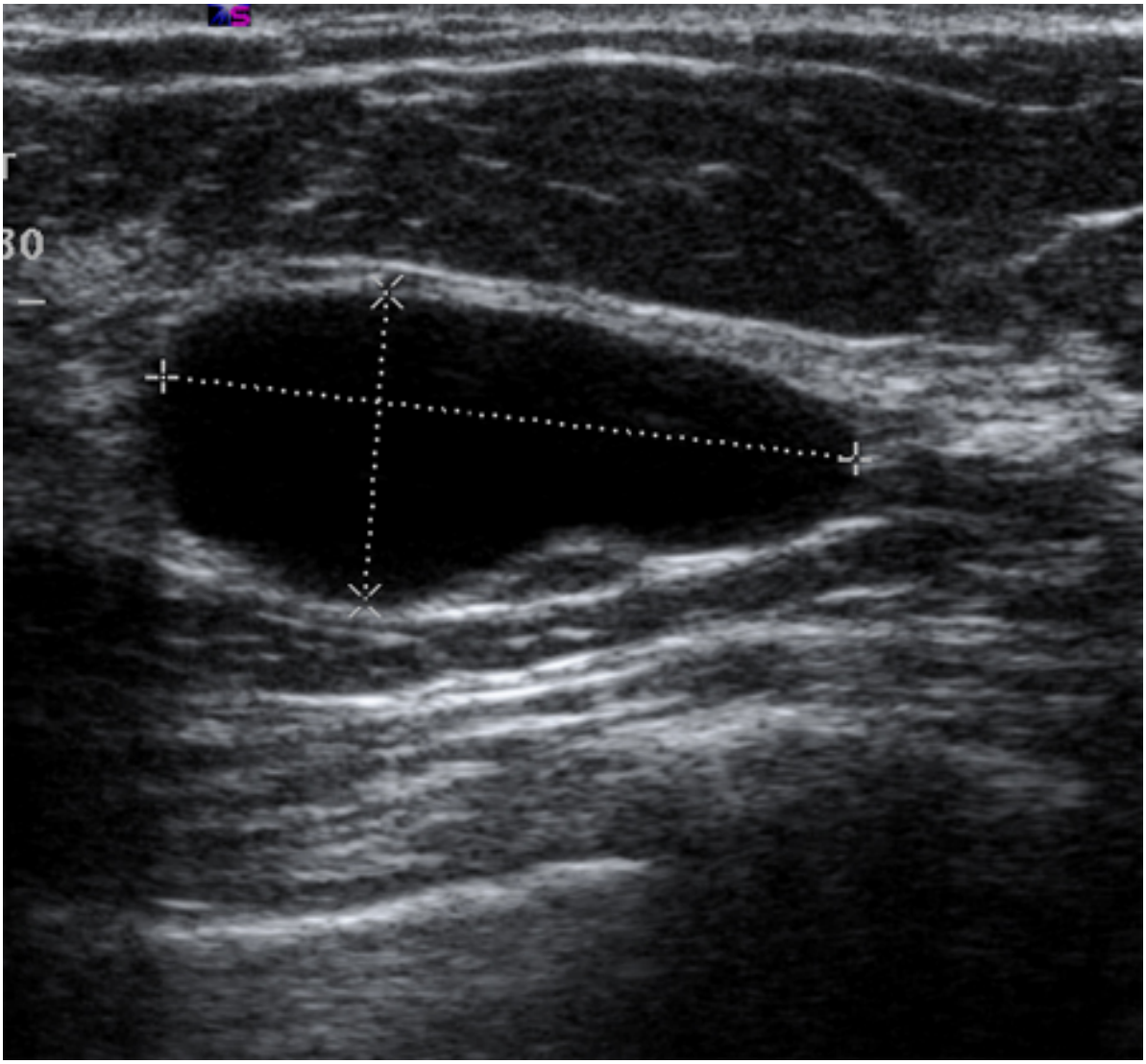
Phyllodes tumour

Rare growths of the breast that can have benign or malignant characteristics.[13] They generally present as a rapidly growing, painless breast mass. Phyllodes tumours are sometimes difficult to distinguish histologically from fibroadenomas.[14] [15] Increased cellularity, atypia, mitoses, and positive margins are often associated with an increased risk of local recurrence for Phyllodes tumours. Tumour size, necrosis, and stromal overgrowth are predictors of distant metastases. None of these, however, is a definitive marker of malignancy, and excision remains the mainstay of management.[13]

Fibrocystic breast

Fibrocystic breast is most commonly found in premenopausal and perimenopausal women.[16] The condition encompasses a spectrum of pathological changes: as well as cysts, it includes epithelial hyperplasia, apocrine metaplasia, and cystic dilation and fibrosis. Patients will sometimes present with a complaint of a discrete mass when they are actually detecting an area of normal nodularity associated with fibrocystic changes. Benign breast cysts are relatively uncommon in postmenopausal women not taking hormones.[17] Their presence in older women should raise the possibility of malignancy.

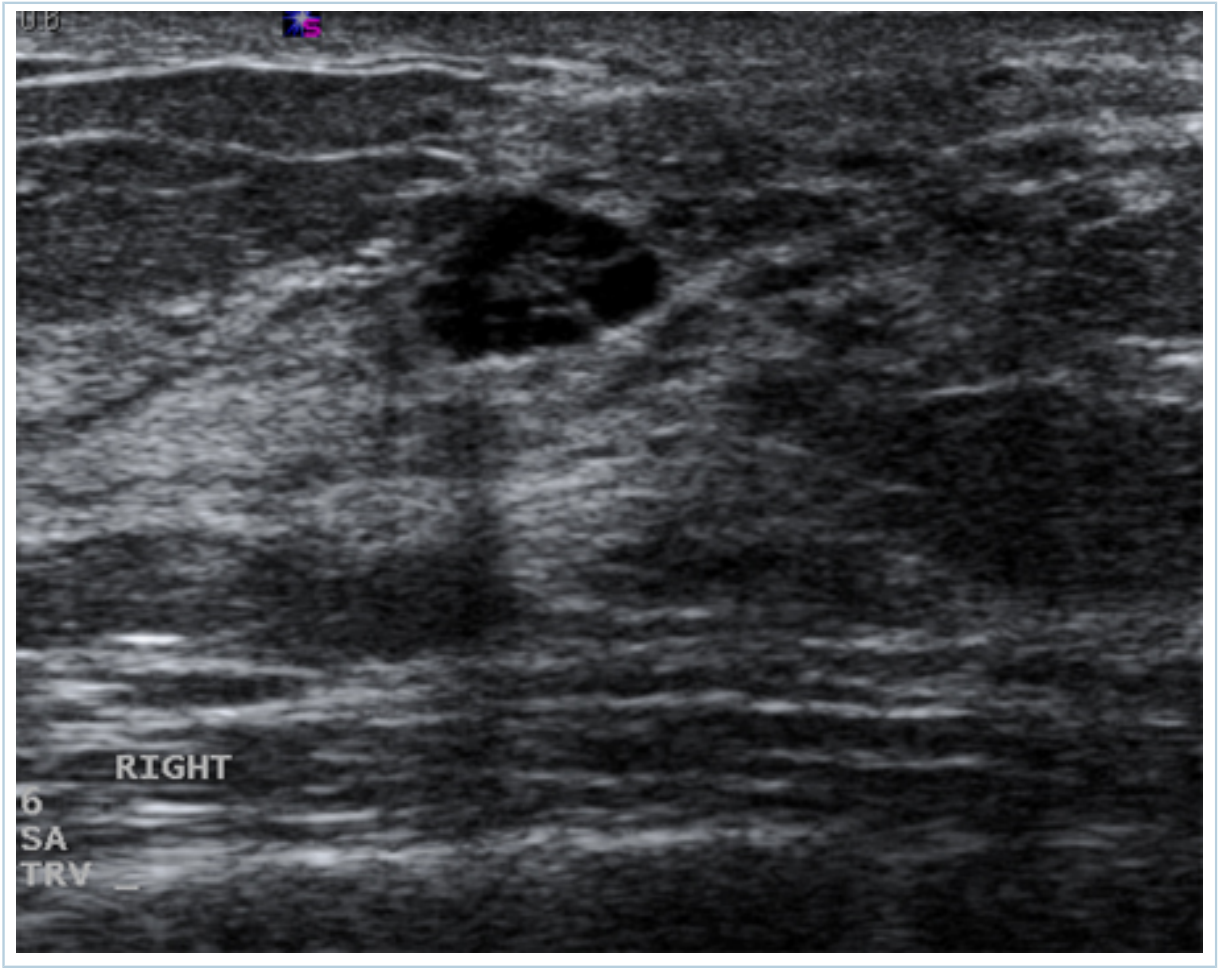
- Cysts are characteristically mobile and have distinct borders on examination.
- Cysts are sometimes tender and can fluctuate with the menstrual cycle.
- Simple cysts are completely anechoic, are distinct from the surrounding breast tissue on breast ultrasound, and are benign.[18]



Ultrasonographic image of a simple cyst

Courtesy of Dr Lane Roland, University of Louisville; used with permission

- Complex cysts are associated with internal septations or debris, and should raise the suspicion of malignancy. National Comprehensive Cancer Network (NCCN) guidance recommends core needle biopsy of complex cysts.[19]



Ultrasonographic image of a complex cyst

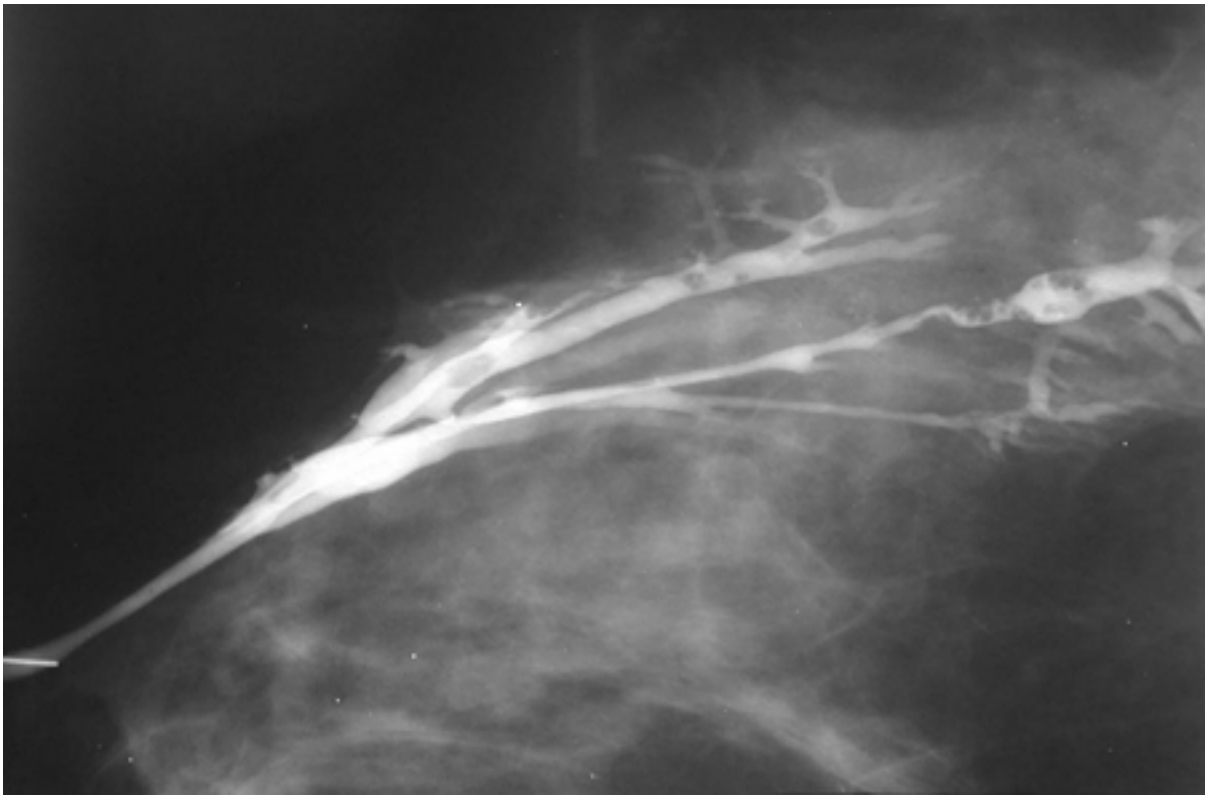
Courtesy of Dr Lane Roland, University of Louisville; used with permission

Fat necrosis

Fat necrosis occurs secondary to injury of the breast. The source may be iatrogenic (e.g., breast biopsy, breast reduction or augmentation) or traumatic (e.g., seat belt injury to the breast).[20] [21] [22] Many women who present with fat necrosis have no recollection of breast trauma. Lesions present as hard, fixed masses and demonstrate acoustic shadowing on ultrasonography - characteristics suspicious for malignancy that mandate biopsy.

Breast papilloma

A bloody nipple discharge is typical of breast papilloma. This type of lesion can occasionally be detected as a mass within the breast. The growths often occur within the breast ducts (intraductal papillomas). These lesions are typically benign, but they can be associated with histological findings of atypia, papillary ductal carcinoma in situ (DCIS), or invasive papillary cancer.

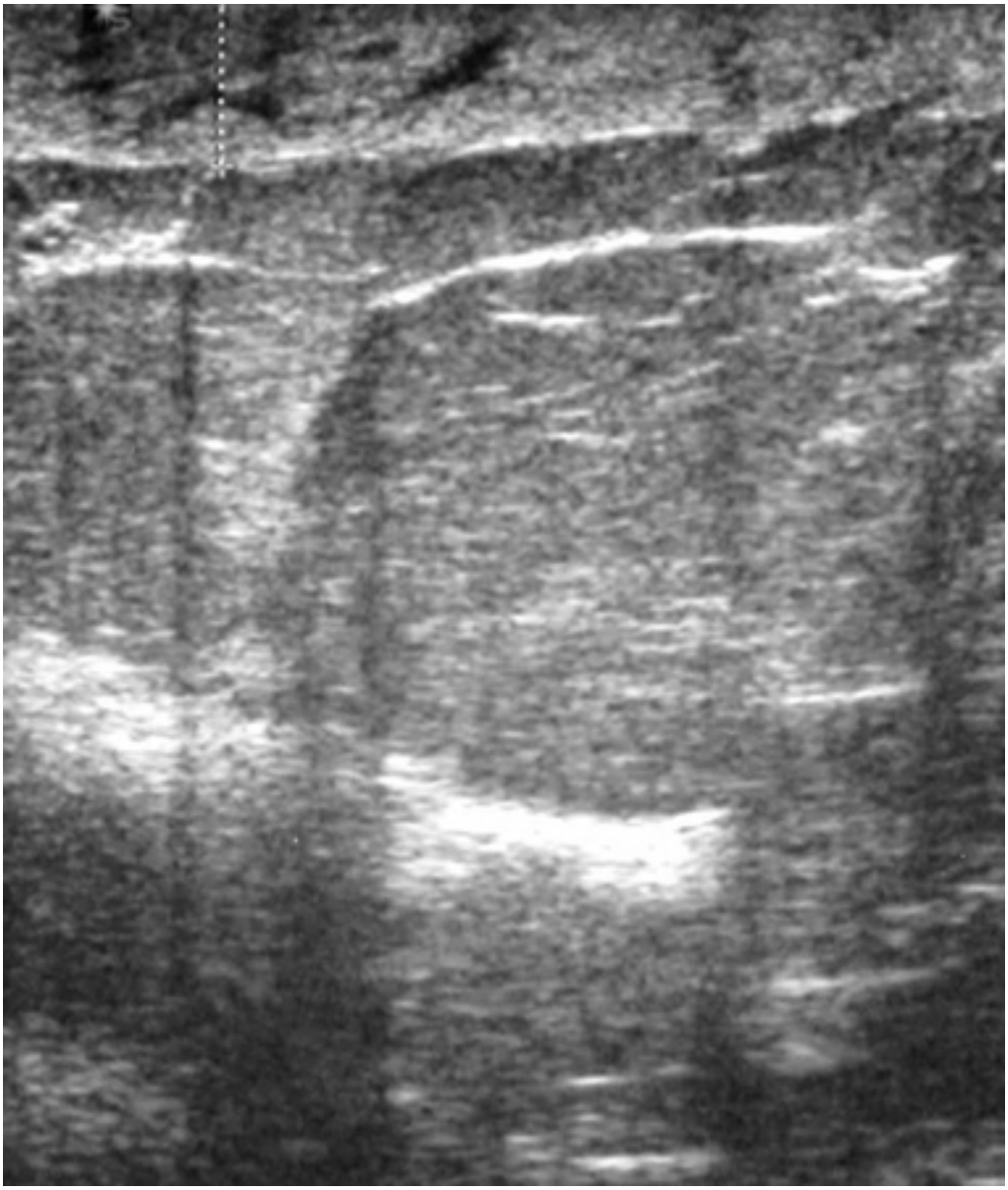


Ductogram demonstrating multiple intraductal papillomas

Courtesy of Dr Nancy Pile, University of Louisville; used with permission

Breast abscess

Breast abscesses typically occur in women who are breastfeeding. They are thought to result from ruptured sub-areolar ducts that leak into the periductal space. Abscess must be differentiated from inflammatory breast cancer (which, paradoxically, does not present as a breast mass).



Ultrasonographic image of skin thickening in patient with inflammatory breast cancer

Courtesy of Dr Nancy Pile, University of Louisville; used with permission

Adenomas

Adenomas are similar to fibroadenomas, but differ slightly in their histology. Many are tubular adenomas, which present as well-demarcated growths in young women. Lactating adenomas may occur during pregnancy or the postpartum period.[23]

Malignant breast masses

Invasive breast carcinoma may present as a palpable (symptomatic) or non-palpable mass, identified on screening imaging (e.g. mammography or MRI in women undergoing high-risk screening). The most common histological subtype is invasive ductal carcinoma, which arises from the ducts of the breast. Some of these tumours (e.g., invasive lobular carcinomas) may present as a palpable mass, due to the single file

pattern of cellular spread characteristic of this histological subtype of malignancy, without related imaging findings.[24]

Other malignant tumour subtypes that are classified as invasive breast carcinoma include tubular carcinoma, mucinous or colloid carcinoma, papillary carcinoma, and medullary carcinoma. All are diagnosed and treated in the same way.

Ductal carcinoma in situ (DCIS) is a proliferation of malignant-appearing epithelial cells that have not penetrated the basement membrane. The terminal duct lobular unit is the origin of most lesions. Most cases are diagnosed on mammography; however, 10% of DCIS lesions present as palpable masses.[25]

Cancer metastatic to the breast is exceedingly rare, comprising 0.5% to 2.0% of metastases from primary cancers.[26] Melanoma, ovarian carcinoma, lung cancer, and lymphoma have been implicated.[27] [28]

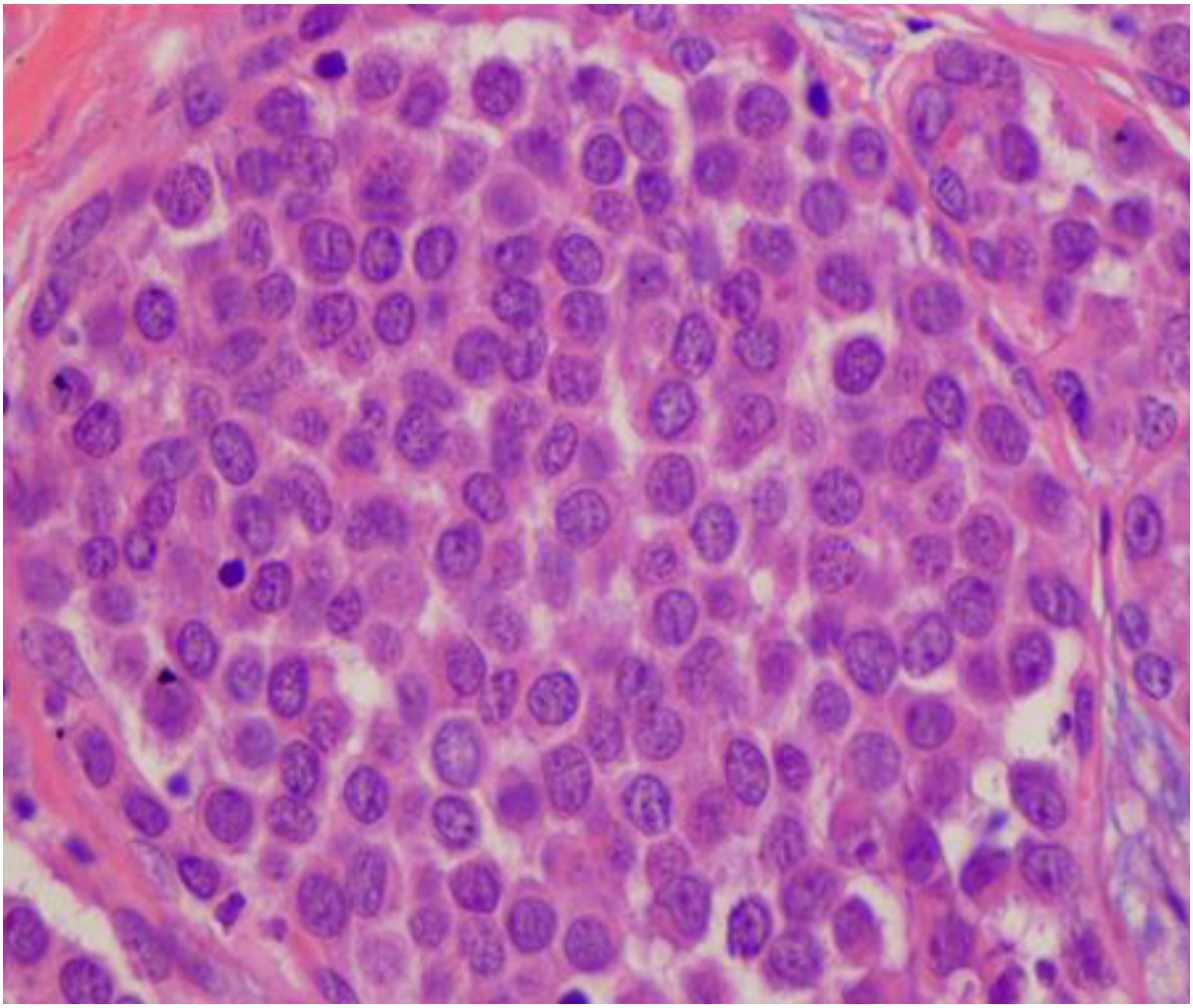
See Primary invasive breast cancer , Breast cancer in situ , and Metastatic breast cancer .

Premalignant breast lesions

Both atypical ductal hyperplasia (ADH) and atypical lobular hyperplasia (ALH) are associated with an increased risk of breast cancer. Core needle biopsy findings of ADH mandate further sampling with vacuum-assisted excision (VAE) or surgical excision of the breast mass, as these lesions are upstaged to ductal carcinoma in situ (DCIS) in nearly 15% of cases.[29] [30]

Lobular carcinoma in situ (LCIS) is an incidental finding that is a marker of increased risk for breast cancer.[24] It may be associated with palpable lesions. LCIS has been classified into 2 subtypes:

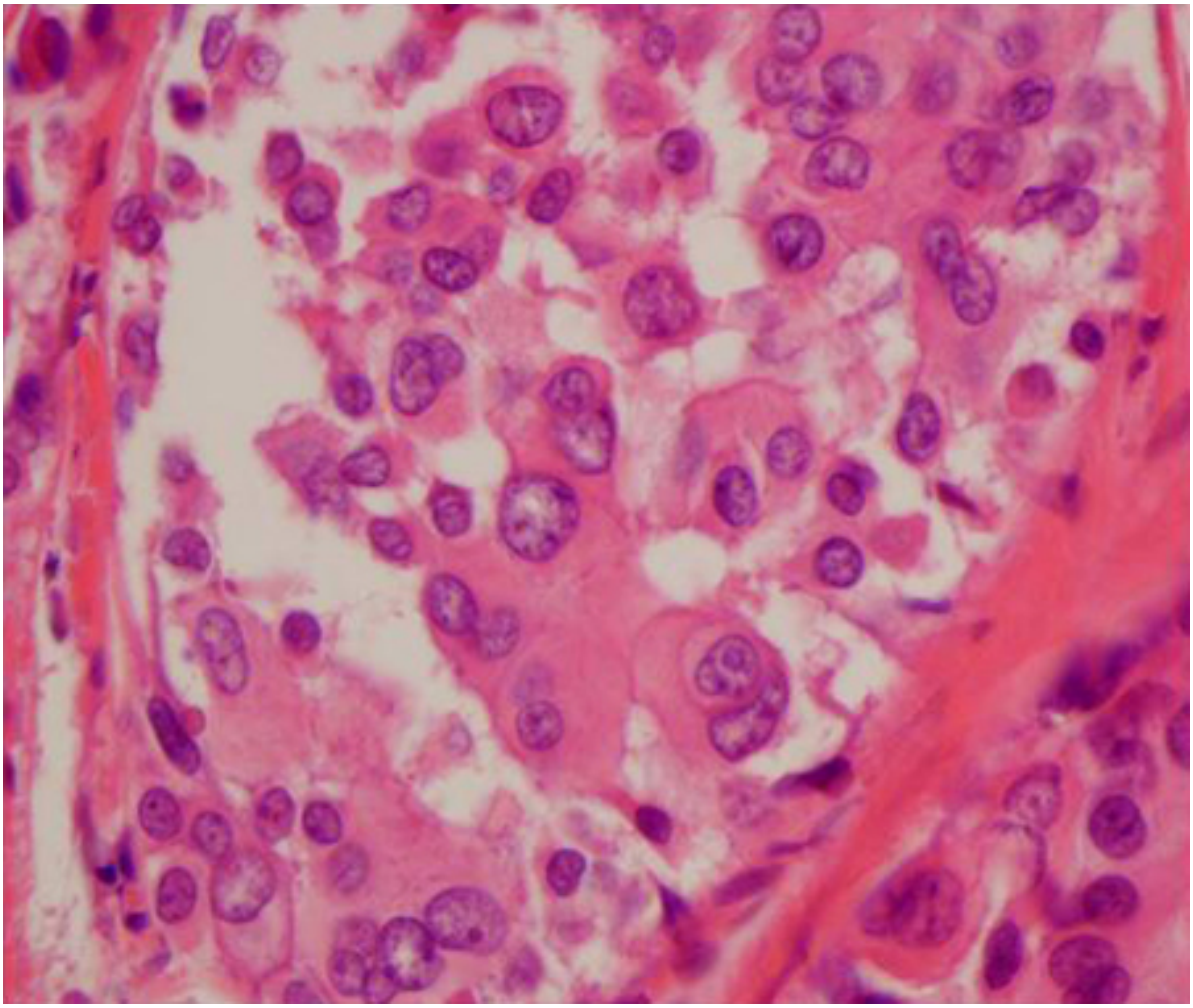
- A classical subtype that is a marker of increased risk in either breast. Further sampling with surgical excision or VAE is recommended, as the risk of upgrade to invasive cancer is up to 27%.[29]



Histopathology of classic lobular carcinoma in situ (LCIS)

Courtesy of Dr Sunati Sahoo, University of Louisville; used with permission

- A pleomorphic subtype that behaves more like DCIS, in that it is thought to be a precursor of invasive disease and needs to be treated in a similar way.



Histopathology of pleomorphic lobular carcinoma in situ (LCIS)

Courtesy of Dr Sunati Sahoo, University of Louisville; used with permission

Urgent considerations

(See **Differentials** for more details)

Invasive carcinoma of the breast

May present as palpable or non-palpable masses (detected incidentally or through screening). On physical examination, the patient usually demonstrates a firm mass, which may be associated with axillary lymphadenopathy, skin changes, and nipple discharge. However, given the widespread use of screening mammography, an asymptomatic patient may be diagnosed with breast cancer after abnormal calcifications and/or architectural distortion are noted on mammogram. Treatment requires a multi-disciplinary approach, involving medical oncologists, breast surgeons, and radiation oncologists.

Carcinoma in situ of the breast

Carcinoma in situ (CIS) of the breast is a non-invasive cancer that originates in the lobules (LCIS) or ducts (DCIS) of the breast. It is typically asymptomatic and diagnosed at screening. Diagnosis is typically based on findings at mammography, ultrasound or magnetic resonance imaging, or biopsy.[18] Tamoxifen can be used to prevent disease progression to invasive carcinoma.

Approach

Increased public awareness of breast cancer has led to a significant proportion of women presenting to clinicians with palpable masses. Breast cancers that are detected clinically or by breast self-examination are typically of more advanced stage.[31] Masses identified on mammography may undergo further evaluation with ultrasonography to determine whether they are cystic or solid. Mammographic screening has led to more breast cancers being detected at a non-palpable stage.[32] [33]

History

The median age at breast cancer diagnosis in women is 63 years.[34] The majority of breast cancers are sporadic (i.e., in patients without a family history of breast cancer).

Approximately 5% to 10% of all breast cancers are diagnosed in patients with a mutation in the BRCA-1 or BRCA-2 genes.[35] Pathogenic variants in BRCA-1 and BRCA-2 are associated with a high risk of breast cancer, with odds ratios of 7.62 (95% CI, 5.33 to 11.27) and 5.23 (95% CI, 4.09 to 6.77), respectively.[36] BRCA-1 and BRCA-2 mutations are more common in women with a family history of:[37]

- breast cancer at or before age 50 years;
- male breast cancer;
- ovarian cancer;
- pancreatic cancer;
- prostate cancer (with metastatic, or high- or very high-risk group);
- ≥3 diagnoses of breast and/or prostate cancer on the same side of the family;
- Ashkenazi Jewish ancestry.

Family history should include any family members with cancer, their primary cancer site, whether the affected relative had multiple primary cancers, age at diagnosis, age at death and sex. [US Preventive Services Task Force. BRCA-related cancer: risk assessment, genetic counselling and genetic testing. 2019] (https://www.uspreventiveservicestaskforce.org/uspstf/recommendation/brca-related-cancer-risk-assessment-genetic-counseling-and-genetic-testing)

Prior biopsy history of atypical hyperplasia carries a four- to fivefold increase in the risk of developing breast cancer.[38] [39] For those with a history of lobular carcinoma in situ (LCIS), there is a seven- to 12-fold increase in risk.[40] Patients diagnosed with an invasive cancer have a risk of contralateral breast cancer that is estimated at 0.5% to 1% a year, cumulative over their lifetime.[40]

In postmenopausal women, hormone replacement therapy with an oestrogen alone is associated with little or no change in the risk of breast cancer.[41] An oestrogen prescribed in combination with a progestin is associated with an increase in the incidence of breast cancer.[41] [42] [43] [44] [45] [46]

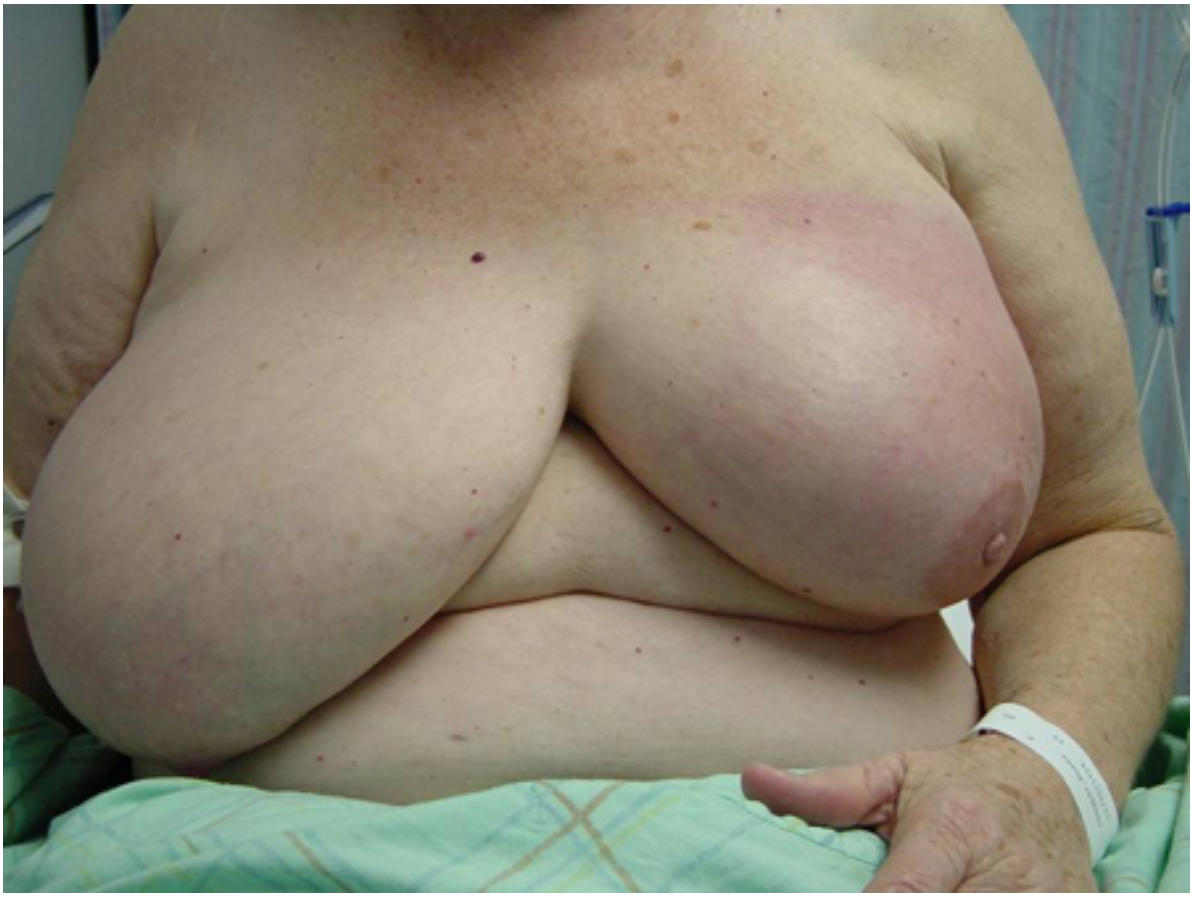
There is an association between increased breast density (categorised by Breast Imaging Reporting and Data System [BI-RADS]) and breast cancer incidence in women over the age of 65 years; however, the mechanisms underlying the observed association are not yet clear.[47]

Physical examination

Findings on physical examination alone cannot definitively establish a mass as benign or malignant. However, irregular fixed masses are suspicious for malignancy.[48] Malignant lesions may also be associated

with skin thickening (e.g., peau d'orange) or nipple changes.[3] A complete bilateral breast examination including assessment of the axillae and regional lymph nodes, should be performed to look for:[49]

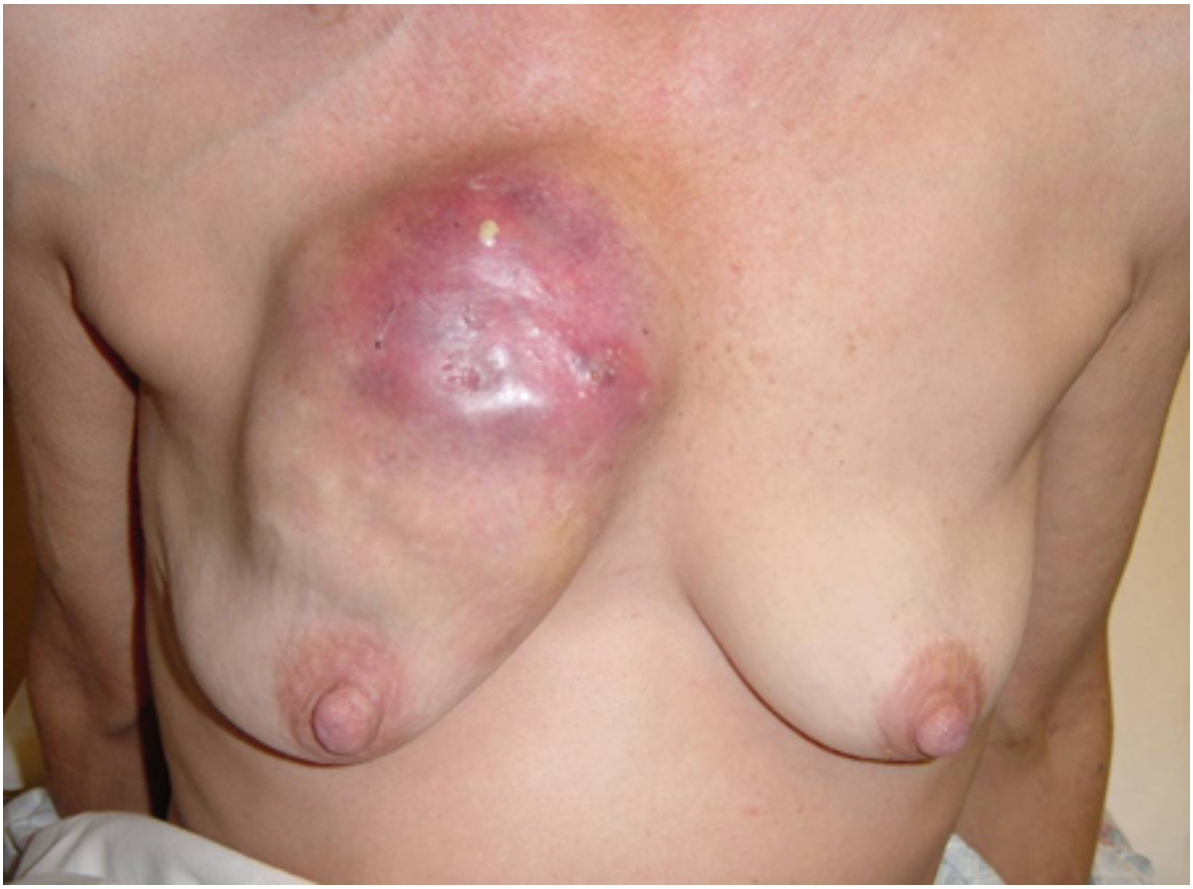
- Variation in breast size



Patient with inflammatory breast cancer who presented with a shrinking breast

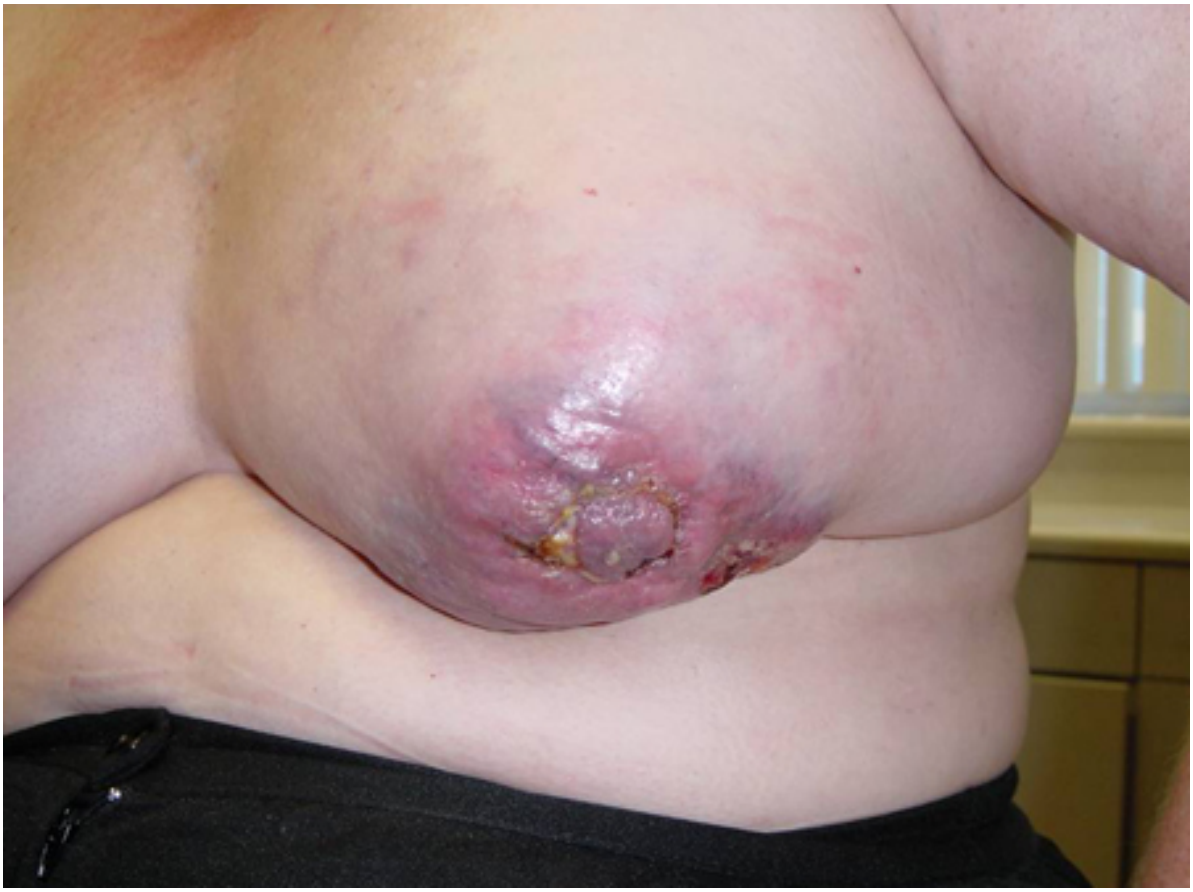
Courtesy of Dr Anees Chagpar

- Fungating masses



Obvious mass with skin involvement on right breast

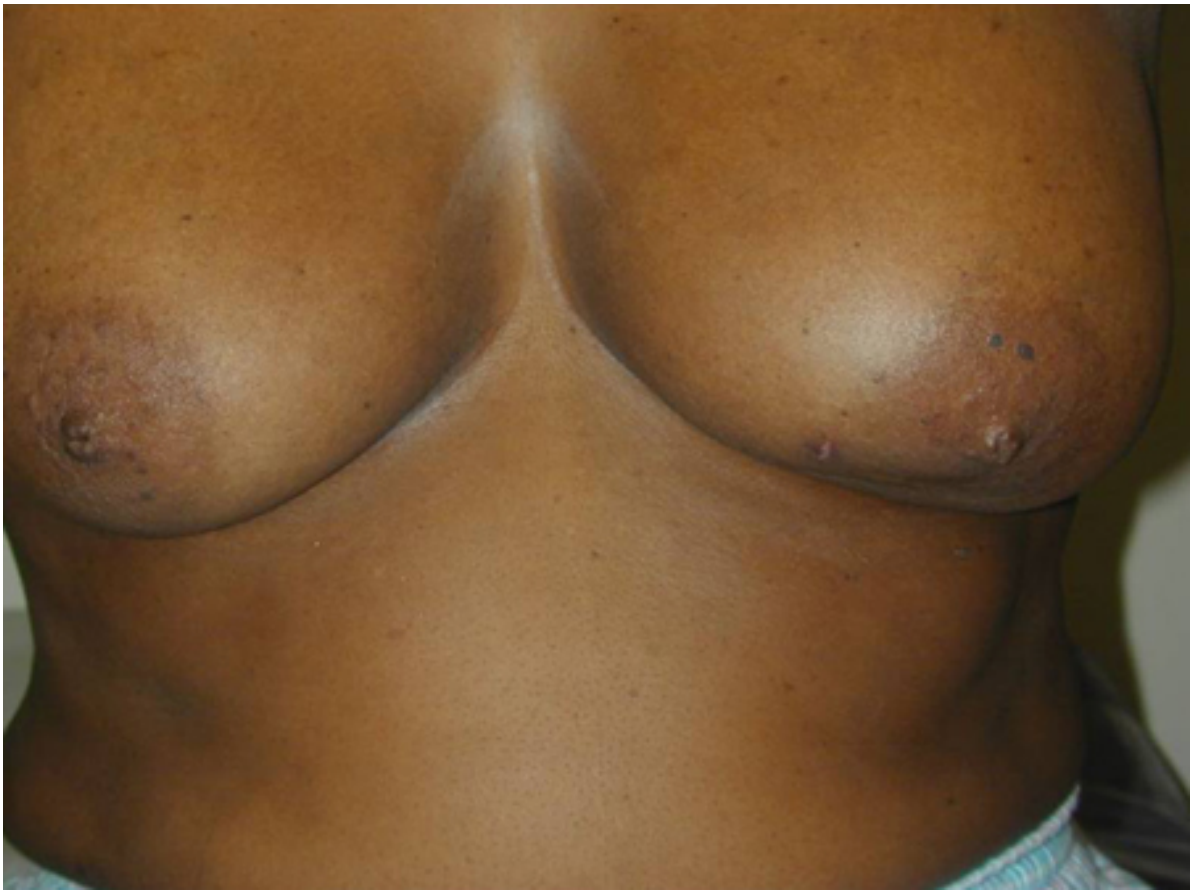
Courtesy of Dr Anees Chagpar



Obvious mass with skin involvement on left breast

Courtesy of Dr Anees Chagpar

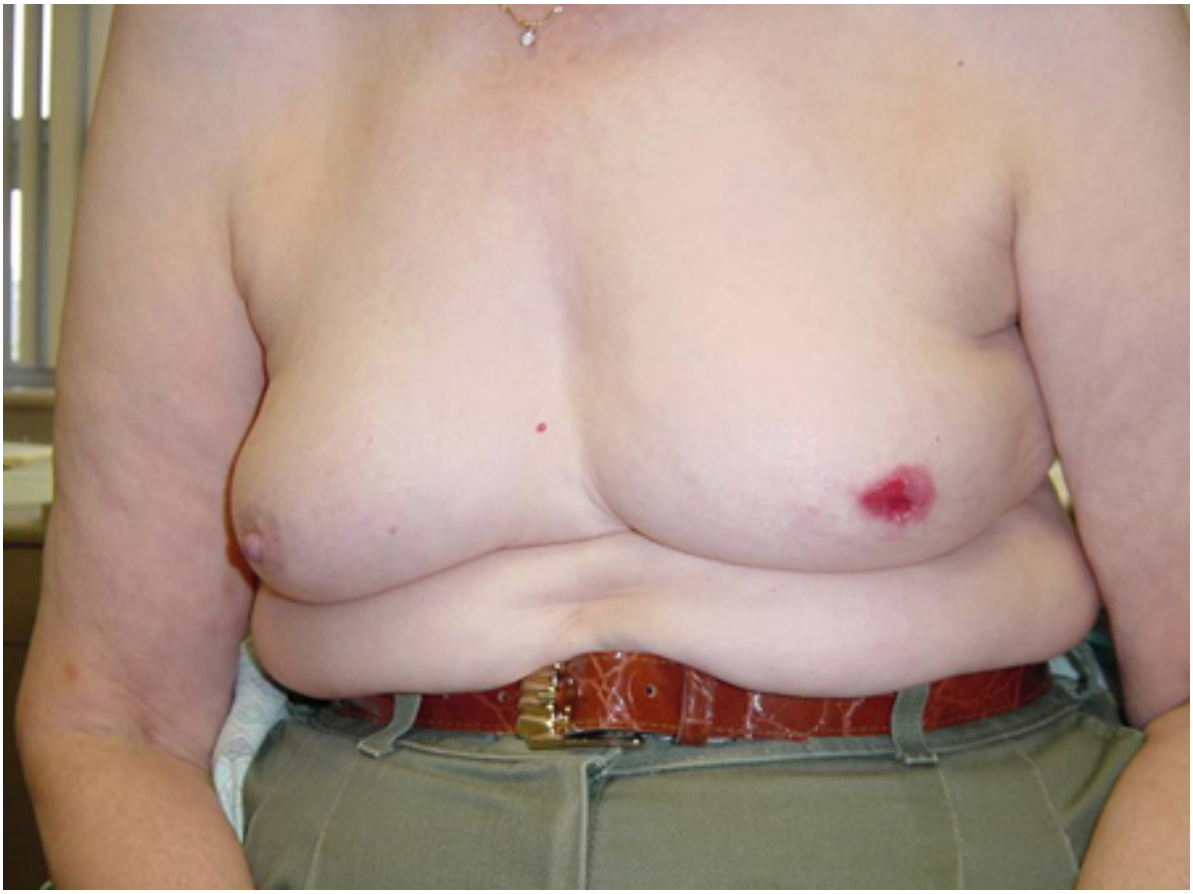
- Dimpling or retraction of the skin



Patient with large breast mass and retraction at 6 o'clock of left breast, noted on elevating arms

Courtesy of Dr Anees Chagpar

- Nipple inversion or excoriation (classic finding of Paget's disease of the breast)



Excoriation of the nipple in a patient with Paget's disease

Courtesy of Dr Anees Chagpar

These findings may be accentuated by having the patient stretch her arms over her head. Similarly, having patients place their hands on their hips and squeeze inwards while flexing the pectoral muscles may reveal chest wall involvement.

The lymph nodes draining the cervical, supraclavicular, and infraclavicular fossae should be evaluated. A comprehensive examination necessitates evaluation of the patient both seated upright and lying supine, as masses are often more readily appreciated in one position than the other.

One randomised controlled trial found that encouraging documentation of the physical examination using a dedicated form resulted in a higher rate of further evaluation of breast masses and an improved cancer detection rate.[50] These results indicate that a focused physical examination can result in performance improvement.

Mammography

US guidelines recommend that all women ≥30 years old presenting with a breast mass should have a diagnostic mammogram (with additional views such as spot compression, magnification, or tangential) and digital breast tomosynthesis (or contrast-enhanced mammography, if available) plus an ultrasound.[19] [51] Multi-focal or multi-centric disease should be noted.

In the setting of a palpable breast mass, mammography is 82% to 94% sensitive and 55% to 84% specific for detecting breast cancer.[52] [53] [54] [55]

In women <30 years with a palpable breast mass and findings on ultrasound that are suspicious for malignancy, US guidelines recommend mammography and digital breast tomography as subsequent imaging studies.[19][51]

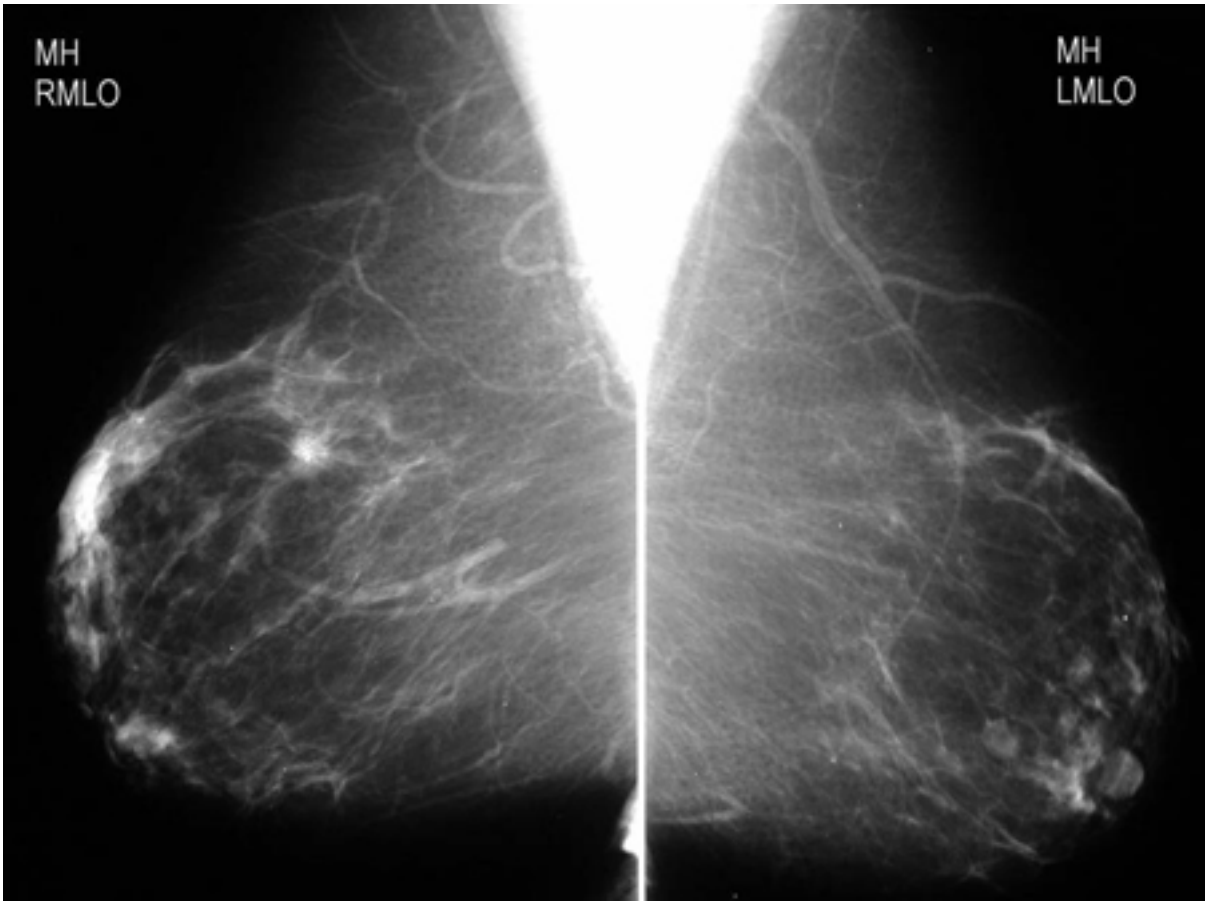
UK guidelines recommend that women ≥30 years with an unexplained breast lump should be referred urgently to a breast specialist for a diagnosis or ruling out of cancer within 28 days of the referral.[56] For women <30 years with an unexplained breast lump, the guidelines recommend consideration for a non-urgent referral.[56]

Radiologists often characterise the findings on ultrasound or mammography according to the BI-RADS.[57] [58] Some have advocated recording breast density and hormone therapy use, as these significantly affect mammography performance.[59] [60]

BIRADS Category	Description	Likelihood of Malignancy	Recommendation
0	Need more information	2-10%	Further imaging studies
1	Normal	0.05-0.1%	Routine screening mammography
2	Benign	0.05-0.1%	Routine screening mammography
3	Probably benign	0.3-1.8%	Short-term follow-up (6 months)
4	Highly suspicious	10-55%	Biopsy
5	Malignant	60-100%	Biopsy
6	Known cancer	100%	Treat malignancy

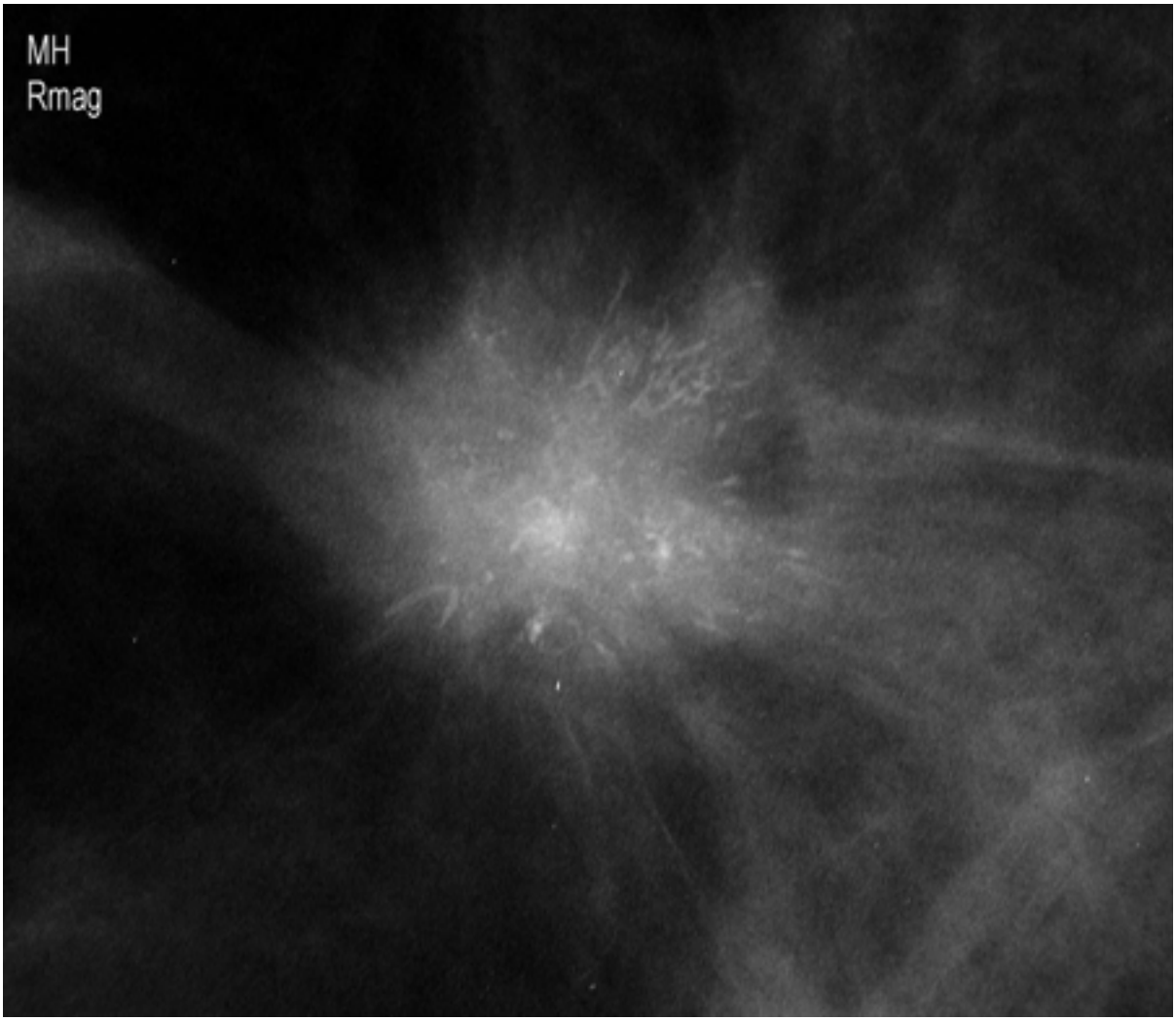
Breast Imaging Reporting and Data System (BIRADS) criteria

Courtesy of Dr Anees Chagpar



Screening mammogram demonstrating breast mass

Courtesy of Dr Nancy Pile, University of Louisville; used with permission



Magnification view demonstrating irregular spiculated mass with associated calcifications

Courtesy of Dr Nancy Pile, University of Louisville; used with permission

BI-RADS was developed by the American College of Radiologists (ACR) as a standard of comparison for rating mammograms and breast ultrasound images.[58] It sets up a classification for level of suspicion (LOS) for the possibility of breast cancer. The ACR recommends that a score of 1 to 2 allows the patient to resume routine screening; a score of 3 may require further imaging with mammography and/or ultrasound scan, or short-term follow-up; a score of 4 to 5 requires a tissue biopsy.[58]

A negative imaging study of a palpable breast mass requires biopsy when clinical suspicion remains high.[19] [51] A score of 6 is given only after a biopsy has been examined and found to be cancerous, in which case treatment is required.[58]

National Comprehensive Cancer Network (NCCN) guidelines recommend that patients with BI-RADS score of 1 and low clinical suspicion for breast cancer should undergo physical examination at 3-6 months.[19] If stable, or there is a decrease in size, routine screening can be reinstated. Further appropriate clinical management (which may include referral to a breast consultant, supplemental imaging, and/or tissue sampling) is recommended if there is significant increase in palpable mass size or if there is clinical suspicion.[19]

The NCCN recommends that patients with a BI-RAD score of 2 with low clinical suspicion (e.g., a simple cyst) resume routine screening. Palpation or image-guided tissue sampling is recommended for patients with BI-RAD score of 2 with clinically suspicious palpable symptoms.[19]

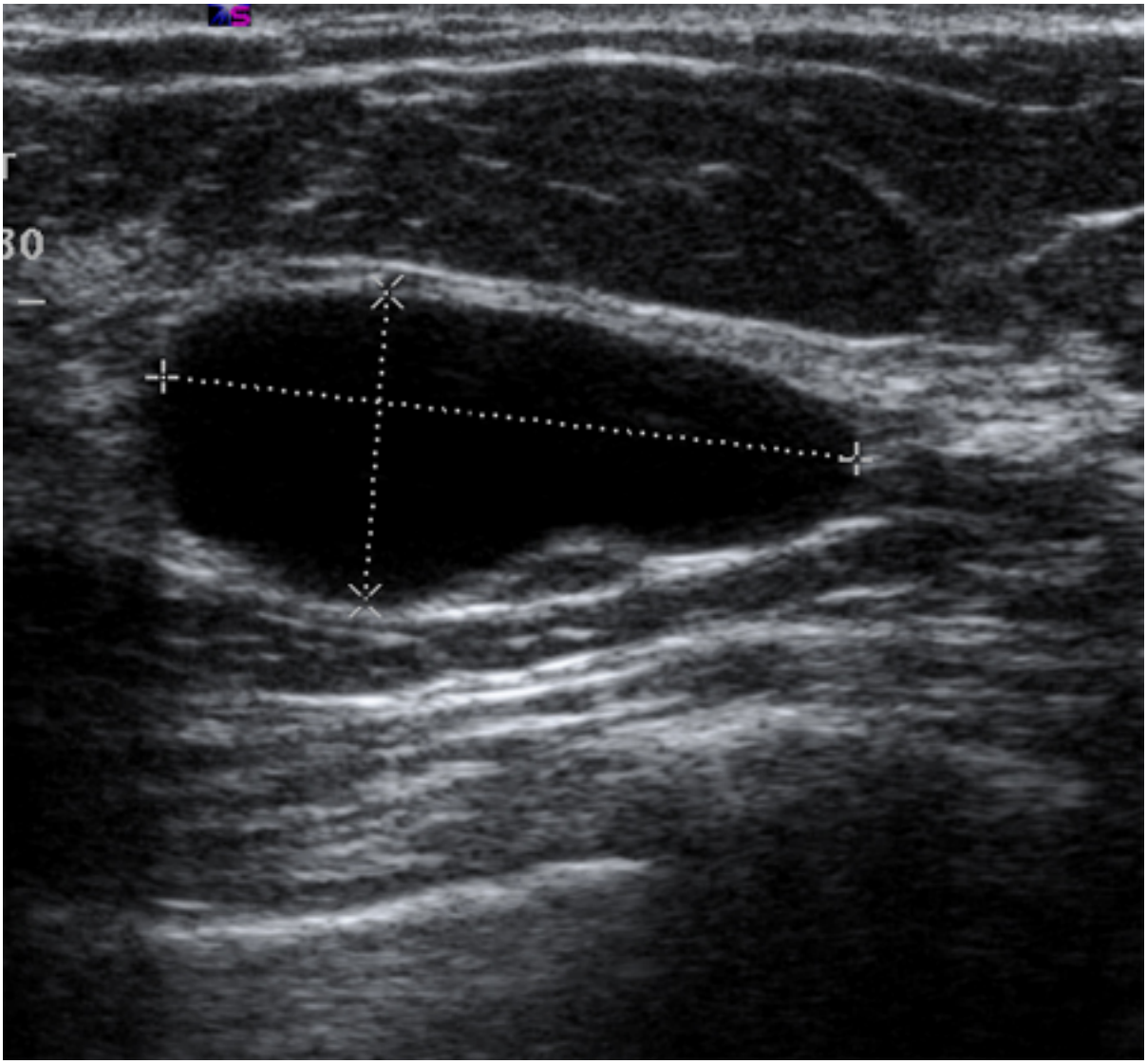
Ultrasound of the breast

Ultrasonography is often considered the initial diagnostic test of choice in patients <30 years old, because the density of breast tissue in younger women limits the sensitivity of mammography.[3] [51] [61] [62] The false-negative rate for mammography has been reported to be as high as 52% in patients <35 years old with a palpable malignant breast mass.[63]

Ultrasound is usually performed in addition to mammography in the assessment of older women with suspected breast cancer.[19] [64]

Ultrasound is routinely available in the outpatient setting and is a ready extension of the physical exam. The American College of Radiology has published guidelines that may aid physicians in the performance of breast ultrasound.[61] [65]

Ultrasound may identify simple or complex cyst architecture.[51] Simple cysts are smooth, round, well-demarcated, fluid-filled lesions, and are anechoic. If they have no internal septations or debris, they may simply be followed. Ultrasound is not able to detect microcalcifications in the breast.



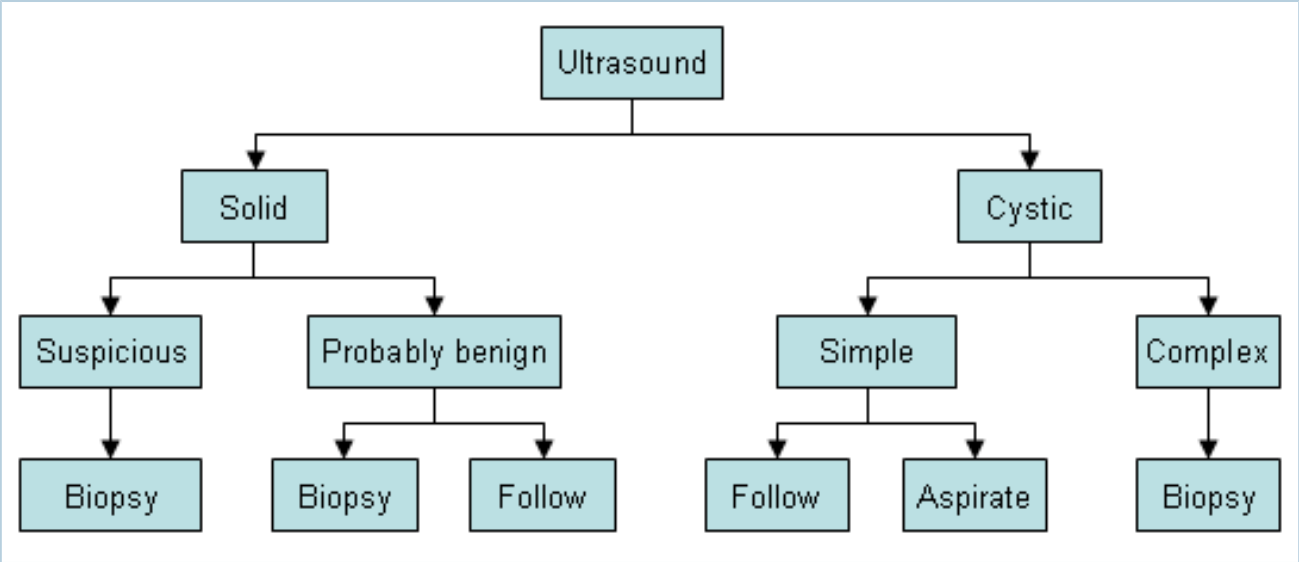
Ultrasonographic image of a simple cyst

Courtesy of Dr Lane Roland, University of Louisville; used with permission

Suggested management for patients with 'probably benign' masses on breast ultrasound includes:[19]

- Observation if clinical suspicion is low, with clinical examination and imaging with ultrasound or mammogram at 6, 12 and 24 months, to document stability.
- Core needle biopsy to make a definitive diagnosis while leaving the lesion in situ. If the result is benign and concordant, a clinical breast examination every 6 to 12 months is recommended, with or without ultrasound or mammogram for 1 year to assess stability.

Ultrasonography of the axilla may also be performed to evaluate lymphadenopathy, and abnormal lymph nodes biopsied.



Diagnostic algorithm for breast ultrasound

Courtesy of Dr Anees Chagpar

Magnetic resonance imaging (MRI) of the breast

National Comprehensive Cancer Network (NCCN) guidelines recommend considering MRI with and without contrast to investigate for inflammatory breast cancer if a patient has skin changes consistent with serious breast disease and is in BI-RADS category 1-3, or is in BI-RADS category 4-5 and has had a benign core needle biopsy.[19] MRI can also be used to evaluate suspicious nipple discharge without a palpable mass if mammography and ultrasound findings are BIRADS 1-3.[19]

The European Society of Medical Oncology recommends breast MRI for investigating suspected breast cancer if there are diagnostic uncertainties following breast ultrasound and mammography.[64]

The US Preventive Services Task Force concludes that there is insufficient evidence to determine the balance of benefits and harms of supplemental screening for breast cancer with MRI (or with breast ultrasound) in women identified to have dense breasts on an otherwise negative screening mammogram.[66]

The American College of Radiology does not recommend MRI in the initial evaluation of a patient with a breast mass.[51]

For patients undergoing MRI, diffusion-weighted imaging may be superior to contrast-enhanced MRI in differentiating benign from malignant lesions.[67] Biopsy is indicated for any suspicious lesion on MRI.

Breast aspiration and biopsy

A definitive diagnosis of breast carcinoma requires a breast biopsy. Three main types of biopsy are commonly performed.

- Fine-needle aspiration (FNA): involves placing a 22- to 25-gauge needle into the breast mass and extracting cells. Increasing the number of passes increases the diagnostic odds ratio of FNA.[68] The cells can then be placed on a slide or made into a cell block. The advantages of FNA are that it is fast and easy to perform and it can be done in the clinic setting. The disadvantages are that it does not show histological architecture, and it cannot help differentiate ductal carcinoma in situ from

invasive malignancy. However, in the hands of an experienced cytopathologist, this technique may help distinguish benign from malignant lesions and is valuable for evaluating axillary lymph nodes.[68] [69]

- Core-needle biopsy: using an 8- to 14-gauge needle, provides a larger tissue sample than FNA. It can be performed by palpation, under stereotactic control, or by ultrasound guidance. This technique can be done in the clinic, is relatively fast and easy to perform, and allows for a histological diagnosis. In the event of a malignant diagnosis, hormone receptor studies may be conducted on needle biopsy specimens. A variety of devices can be used to obtain these specimens, some using vacuum assistance, others radiofrequency energy.[70] [71] In general, core needle biopsy is the method of choice for histological diagnosis of breast masses.[72]
- Excisional biopsy: entails removing the entire breast mass for an accurate histological diagnosis. This invasive technique, in the case of a benign asymptomatic mass, may be unnecessary; and in the case of a malignant mass, it may not obviate the need for a second procedure to treat the cancer once a diagnosis is made. Needle biopsy findings of atypical hyperplasia or radial scars require excisional biopsy to rule out concomitant malignancy.

Type of biopsy	Advantages	Disadvantages
FNA	Easy Relatively painless Office-based procedure Very small needle	Requires expert cytopathologist Unable to evaluate histology
Core needle	Easy Relatively painless Office-based procedure Standard histopathology Able to assess tissue architecture Able to obtain receptor status	Slightly larger needle
Excisional biopsy	Standard histopathology Able to assess tissue architecture Able to obtain receptor status	Requires procedure suite or operating room Larger incision More painful

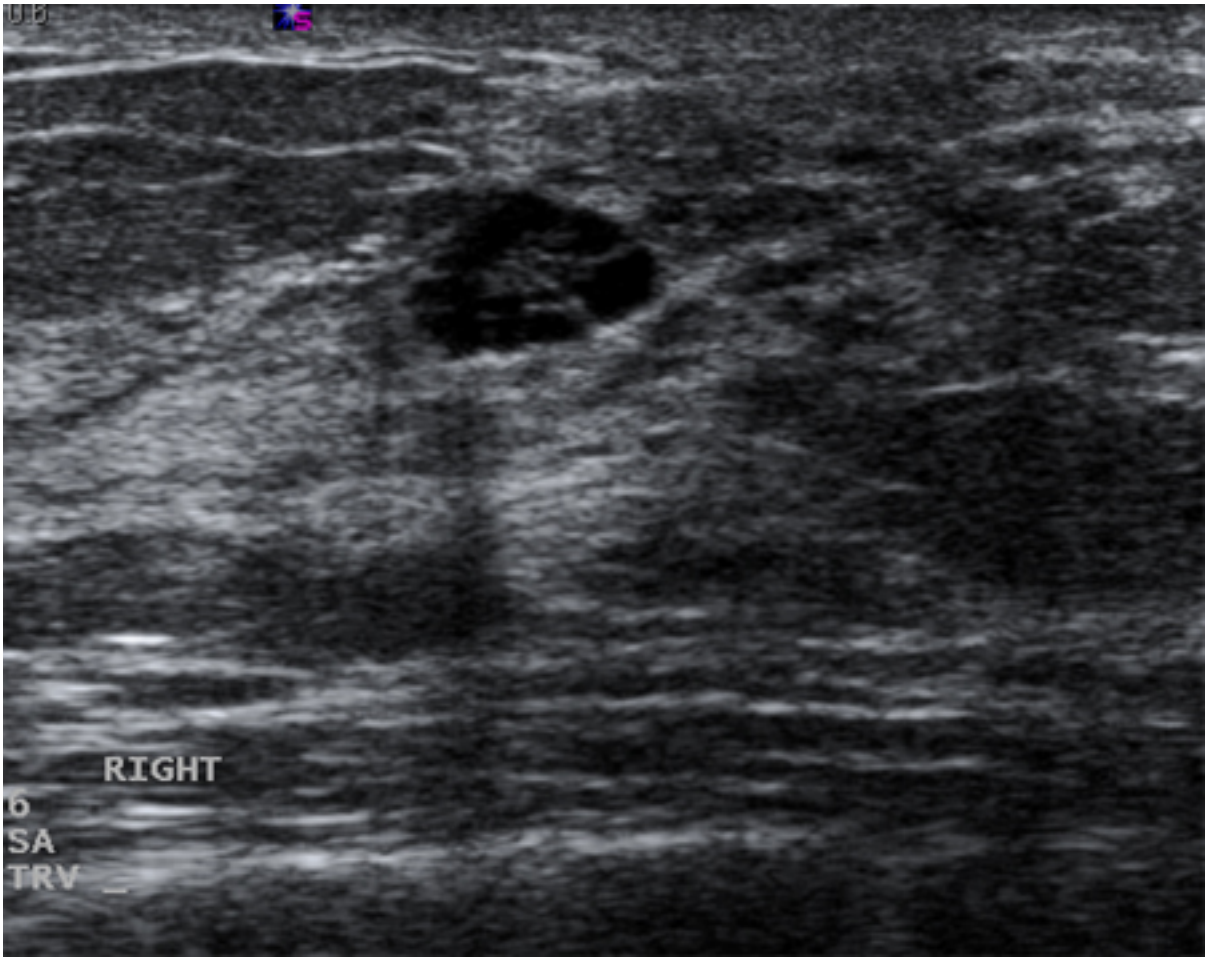
Breast biopsy techniques (FNA; fine needle aspiration)

Courtesy of Dr Anees Chagpar

Painful cysts

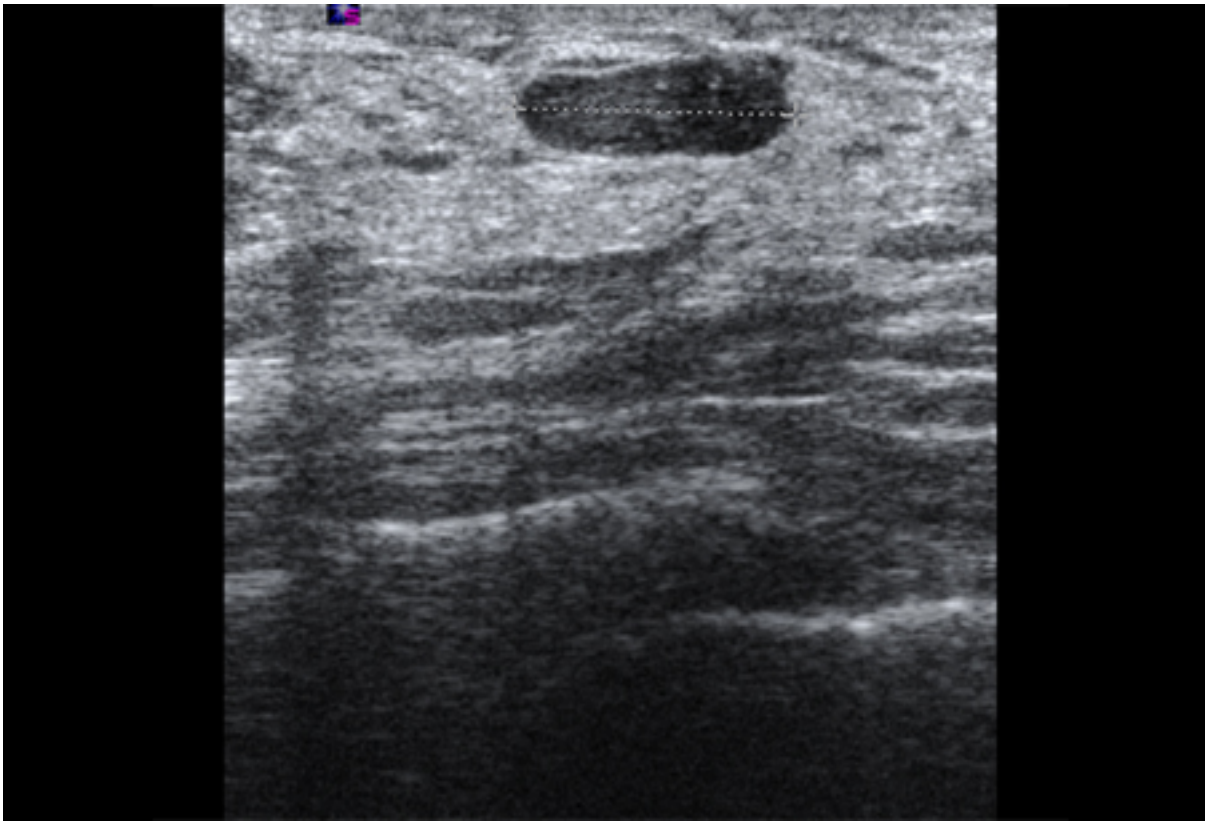
May be aspirated under ultrasound guidance. Aspirated cyst fluid should not be sent for cytology, because, with the exception of bloody cystic fluid, malignant cells are generally not identified.[73]

Cysts that recur or do not completely resolve with aspiration should be biopsied to rule out malignancy. Similarly, biopsy should be considered in complex cysts or those with solid elements. Sonographic characteristics may classify a solid mass as either 'probably benign' or 'suspicious'. Masses that are smooth, oval, lobulated, with clearly defined margins, and that are wider than they are tall, are often benign (e.g., fibroadenoma). If a mass is irregular, heterogeneous, has poorly defined or spiculated margins, and is taller than it is wide, it is considered 'suspicious' for malignancy, and biopsy should be undertaken.



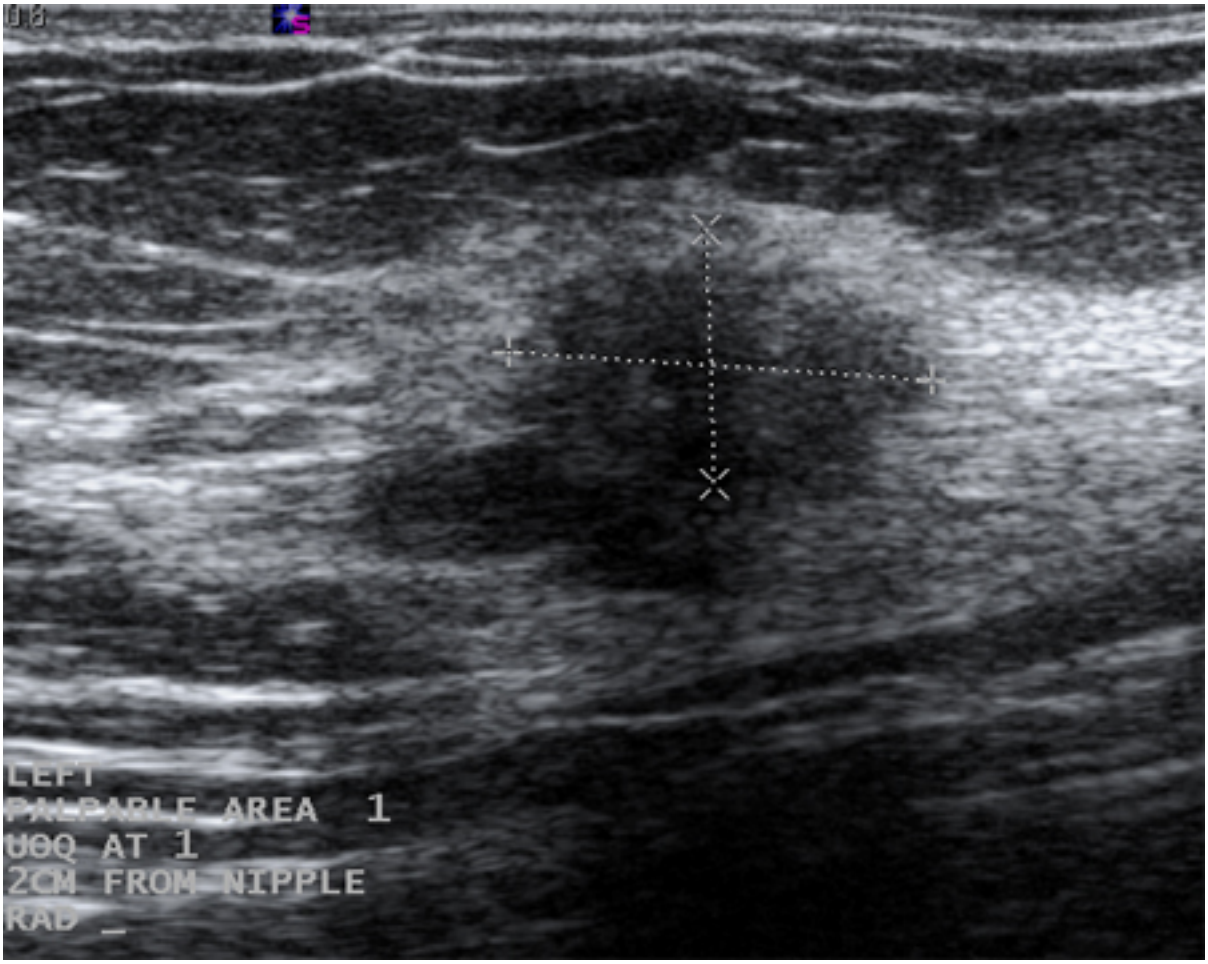
Ultrasonographic image of a complex cyst

Courtesy of Dr Lane Roland, University of Louisville; used with permission



Ultrasonographic image of a fibroadenoma

Courtesy of Dr Lane Roland, University of Louisville; used with permission



Ultrasonographic image of an invasive carcinoma

Courtesy of Dr Lane Roland, University of Louisville; used with permission

Differentials overview

Common
Fibroadenoma
Fibrocystic breast
Fat necrosis
Intraductal papilloma
Breast abscess
Invasive breast cancer
Ductal carcinoma in situ (DCIS)
Uncommon
Phyllodes tumour
Adenoma
Atypical ductal hyperplasia (ADH) and atypical lobular hyperplasia (ALH)
Radial scar
Lobular carcinoma in situ (LCIS)

Differentials

Common

◊ Fibroadenoma

History	Exam	1st Test	Other tests
asymptomatic, found incidentally, typical patient <40 years old	smooth, rubbery, mobile mass	»**mammogram:** oval or round, circumscribed, may have coarse calcifications »**breast ultrasound:** solid, oval or round, circumscribed, lobulated, width greater than height	»**breast biopsy:** epithelial and stromal elements

◊ Fibrocystic breast

History	Exam	1st Test	Other tests
breast pain; commonly found in pre- and perimenopausal women; symptoms fluctuate with menstrual cycles	rubbery, well-circumscribed, mobile mass	»**breast ultrasound:** simple cysts: well-circumscribed with sharp borders, no internal echoes; complex cysts: cystic and solid components	»**mammography:** cannot distinguish between cystic and solid masses »**breast aspiration:** resolution of cysts after aspiration suggests a benign cyst

◊ Fat necrosis

History	Exam	1st Test	Other tests
prior breast trauma, surgical reduction, or augmentation	firm mass, irregular borders	»**breast ultrasound:** indistinct margins, solid May closely resemble carcinoma. »**mammography:** indistinct margins, sometimes with calcifications May closely resemble carcinoma. »**breast biopsy:** fat necrosis	

Common

◊ Intraductal papilloma

History	Exam	1st Test	Other tests
bloody nipple discharge	mass usually small, not always palpable	»**mammogram:** may be negative »**breast ultrasound:** dilated duct with oval mass »**breast ductogram:** filling defect of duct	»**breast biopsy:** papillary growth pattern: benign papilloma, or atypia, papillary ductal carcinoma in situ, or invasive papillary carcinoma

◊ Breast abscess

History	Exam	1st Test	Other tests
breast pain, fever; alarming, rapid enlargement	breast fluctuance, tenderness, and skin erythema; associated mastitis	»**breast ultrasound:** fluid-filled cavity containing debris	»**breast aspiration:** purulent fluid

Invasive breast cancer

History	Exam	1st Test	Other tests
gradual breast enlargement noted, personal or family history of breast cancer	hard, fixed mass; nipple inversion, nipple discharge, skin retraction, peau d'orange, lymphadenopathy	»**mammogram:** indistinct or spiculated margins, increased density, fine pleomorphic calcifications »**breast ultrasound:** irregular shape, ill-defined margins, height greater than width, punctate calcifications, hypoechogenicity Best test in women <30 years old.[3] [51] [61] [62]	»**breast biopsy:** cells with hyperchromatic nuclei invading into stroma

Ductal carcinoma in situ (DCIS)

History	Exam	1st Test	Other tests
usually asymptomatic	breast mass may or may not be present; nipple discharge, breast tenderness, cracking of	»**mammography:** often associated with microcalcifications	»**breast biopsy:** malignant cells involving ducts that do

Common

Ductal carcinoma in situ (DCIS)

History	Exam	1st Test	Other tests
	skin (Paget's disease of breast)		not cross the basement membrane

Uncommon

◊ Phyllodes tumour

History	Exam	1st Test	Other tests
40 to 60 years old; recent onset and rapid enlargement of breast	well-delineated, large breast mass	»**mammography:** oval, circumscribed mass »**breast ultrasound:** hypoechoic, well-circumscribed mass »**breast biopsy:** stromal and epithelial elements; histological classification can vary from benign to malignant Can be difficult to distinguish from fibroadenoma on FNA and core-needle biopsy.[14] [15]	

◊ Adenoma

History	Exam	1st Test	Other tests
painless, slowly enlarging breast mass	well-circumscribed, mobile mass	»**mammography:** round or oval lesion with circumscribed margins	»**breast ultrasound:** solid, well-circumscribed mass »**breast biopsy:** tubular adenoma

Uncommon

◊ Atypical ductal hyperplasia (ADH) and atypical lobular hyperplasia (ALH)

History	Exam	1st Test	Other tests
usually found incidentally	rarely presents as palpable mass	»**mammogram:** no specific findings »**ultrasound:** no specific findings »**breast biopsy:** atypical cells Finding of atypical cells on core-needle biopsy mandates further sampling with vacuum-assisted excision or with surgical excision, to rule out concomitant ductal carcinoma in situ (DCIS) or invasive carcinoma.	

◊ Radial scar

History	Exam	1st Test	Other tests
usually found incidentally	rarely presents as palpable mass	»**mammogram:** no specific findings »**ultrasound:** no specific findings »**breast biopsy:** atypical cells	

Lobular carcinoma in situ (LCIS)

History	Exam	1st Test	Other tests
usually found incidentally on breast biopsy for another purpose	rarely presents as a palpable mass	»**mammogram:** no specific findings »**breast ultrasound:** no specific findings »**breast biopsy:** malignant cells within lobular acini, basement membrane intact	

Uncommon

Lobular carcinoma in situ (LCIS)

History	Exam	1st Test	Other tests
		Further sampling with vacuum-assisted excision or with surgical excision is recommended.	

Guidelines

United Kingdom

Early and locally advanced breast cancer: diagnosis and management (https://www.nice.org.uk/guidance/ng101)

Published by: National Institute for Health and Care Excellence
Last published: 2025

Suspected cancer: recognition and referral (https://www.nice.org.uk/guidance/ng12)

Published by: National Institute for Health and Care Excellence
Last published: 2025

Europe

Early breast cancer: ESMO clinical practice guideline for diagnosis, treatment and follow-up (https://www.esmo.org/guidelines/breast-cancer/early-breast-cancer)

Published by: European Society of Medical Oncology
Last published: 2023

North America

NCCN clinical practice guidelines in oncology: breast cancer screening and diagnosis (https://www.nccn.org/guidelines/category_2)

Published by: National Comprehensive Cancer Network
Last published: 2025

ACR appropriateness criteria: palpable breast masses (https://www.acr.org/Clinical-Resources/Clinical-Tools-and-Reference/Appropriateness-Criteria)

Published by: American College of Radiology
Last published: 2022

Practice bulletin no. 164: diagnosis and management of benign breast disorders (https://www.acog.org/clinical/clinical-guidance/practice-bulletin)

Published by: American College of Obstetricians and Gynecologists
Last published: 2016

Online resources

1. US Preventive Services Task Force. BRCA-related cancer: risk assessment, genetic counselling and genetic testing. 2019 *(external link) (https://www.uspreventiveservicestaskforce.org/uspstf/recommendation/brca-related-cancer-risk-assessment-genetic-counseling-and-genetic-testing)*

Key articles

- National Comprehensive Cancer Network. NCCN clinical practice guidelines in oncology: breast cancer screening and diagnosis [internet publication]. Full text (https://www.nccn.org/guidelines/category_2)
- American College of Radiology. ACR appropriateness criteria: palpable breast masses. 2022 [internet publication]. Full text (https://acsearch.acr.org/docs/69495/Narrative)
- American College of Radiology. ACR practice parameter for the performance of a diagnostic breast ultrasound examination. 2021 [internet publication]. Full text (https://www.acr.org/-/media/ACR/Files/Practice-Parameters/US-Breast.pdf?la=en)
- American College of Radiology. ACR practice parameter for the performance of ultrasound-guided percutaneous breast interventional procedures. 2021 [internet publication]. Full text (https://www.acr.org/-/media/ACR/Files/Practice-Parameters/US-GuidedBreast.pdf?la=en)

References

1. Barton MB, Elmore JG, Fletcher SW. Breast symptoms among women enrolled in a health maintenance organization: frequency, evaluation, and outcome. Ann Intern Med. 1999 Apr 20;130(8):651-7. Abstract (http://www.ncbi.nlm.nih.gov/pubmed/10215561?tool=bestpractice.bmj.com)
2. Beyer T, Moonka R. Normal mammography and ultrasonography in the setting of palpable breast cancer. Am J Surg. 2003 May;185(5):416-9. Abstract (http://www.ncbi.nlm.nih.gov/pubmed/12727559?tool=bestpractice.bmj.com)
3. Practice bulletin no. 164: diagnosis and management of benign breast disorders. Obstet Gynecol. 2016 Jun;127(6):e141-56. Abstract (http://www.ncbi.nlm.nih.gov/pubmed/27214189?tool=bestpractice.bmj.com)
4. Vetto JT, Pommier RF, Schmidt WA, et al. Diagnosis of palpable breast lesions in younger women by the modified triple test is accurate and cost-effective. Arch Surg. 1996 Sep;131(9):967-72. Abstract (http://www.ncbi.nlm.nih.gov/pubmed/8790167?tool=bestpractice.bmj.com)
5. Vetto JT, Pommier RF, Schmidt WA, et al. Use of the "triple test" for palpable breast lesions yields high diagnostic accuracy and cost savings. Am J Surg. 1995 May;169(5):519-22. Abstract (http://www.ncbi.nlm.nih.gov/pubmed/7747833?tool=bestpractice.bmj.com)
6. Morris A, Pommier RF, Schmidt WA, et al. Accurate evaluation of palpable breast masses by the triple test score. Arch Surg. 1998 Sep;133(9):930-4. Full text (http://archsurg.jamanetwork.com/article.aspx?articleid=211721) Abstract (http://www.ncbi.nlm.nih.gov/pubmed/9749842?tool=bestpractice.bmj.com)

REFERENCES

7. Abdelwahab Yousef AJ. Male breast cancer: epidemiology and risk factors. Semin Oncol. 2017 Aug;44(4):267-72. Abstract (http://www.ncbi.nlm.nih.gov/pubmed/29526255?tool=bestpractice.bmj.com)

8. American College of Radiology. ACR appropriateness criteria: evaluation of the symptomatic male breast. 2018 [internet publication]. Full text (https://acsearch.acr.org/docs/3091547/Narrative)

9. Dent DM, Cant PJ. Fibroadenoma. World J Surg. 1989 Nov-Dec;13(6):706-10. Abstract (http://www.ncbi.nlm.nih.gov/pubmed/2696223?tool=bestpractice.bmj.com)

10. Martin PM, Kuttenn F, Serment H, et al. Studies on clinical, hormonal and pathological correlations in breast fibroadenomas. J Steroid Biochem. 1978 Dec;9(12):1251-5. Abstract (http://www.ncbi.nlm.nih.gov/pubmed/745423?tool=bestpractice.bmj.com)

11. Dupont WD, Page DL, Parl FF, et al. Long-term risk of breast cancer in women with fibroadenoma. N Engl J Med. 1994 Jul 7;331(1):10-5. Full text (http://www.nejm.org/doi/full/10.1056/NEJM199407073310103) Abstract (http://www.ncbi.nlm.nih.gov/pubmed/8202095?tool=bestpractice.bmj.com)

12. Nassar A, Visscher DW, Degnim AC, et al. Complex fibroadenoma and breast cancer risk: a Mayo Clinic benign breast disease cohort study. Breast Cancer Res Treat. 2015 Sep;153(2):397-405. Full text (https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4561026) Abstract (http://www.ncbi.nlm.nih.gov/pubmed/26264469?tool=bestpractice.bmj.com)

13. Tan BY, Acs G, Apple SK, et al. Phyllodes tumours of the breast: a consensus review. Histopathology. 2016 Jan;68(1):5-21. Abstract (http://www.ncbi.nlm.nih.gov/pubmed/26768026?tool=bestpractice.bmj.com)

14. Zhang L, Yang C, Pfeifer JD, et al. Histopathologic, immunophenotypic, and proteomics characteristics of low-grade phyllodes tumor and fibroadenoma: more similarities than differences. NPJ Breast Cancer. 2020 Jun 26:6:27. Full text (https://www.nature.com/articles/s41523-020-0169-8) Abstract (http://www.ncbi.nlm.nih.gov/pubmed/32613078?tool=bestpractice.bmj.com)

15. Tummidi S, Kothari K, Agnihotri M, et al. Fibroadenoma versus phyllodes tumor: a vexing problem revisited!. BMC Cancer. 2020 Jul 13;20(1):648. Full text (https://bmccancer.biomedcentral.com/articles/10.1186/s12885-020-07129-0) Abstract (http://www.ncbi.nlm.nih.gov/pubmed/32660435?tool=bestpractice.bmj.com)

16. Frantz VK, Pickren JW, Melcher GW, et al. Incidence of chronic cystic disease in so-called "normal" breasts; a study based on 225 postmortem examinations. Cancer. 1951 Jul;4(4):762-83. Abstract (http://www.ncbi.nlm.nih.gov/pubmed/14859197?tool=bestpractice.bmj.com)

17. Stachs A, Stubert J, Reimer T, et al. Benign breast disease in women. Dtsch Arztebl Int. 2019 Aug 9;116(33-34):565-74. Full text (https://www.aerzteblatt.de/int/archive/article/209397) Abstract (http://www.ncbi.nlm.nih.gov/pubmed/31554551?tool=bestpractice.bmj.com)

18. Stavros AT, Thickman D, Rapp CL, et al. Solid breast nodules: use of sonography to distinguish between benign and malignant lesions. Radiology. 1995 Jul;196(1):123-34. Abstract (http://www.ncbi.nlm.nih.gov/pubmed/7784555?tool=bestpractice.bmj.com)

19. National Comprehensive Cancer Network. NCCN clinical practice guidelines in oncology: breast cancer screening and diagnosis [internet publication]. Full text (https://www.nccn.org/guidelines/category_2)

20. Haran O, Legarda C, Gofstein D, et al. Treatment algorithm of postsurgical fat necrosis of the breast-revisited. Semin Plast Surg. 2022 Jun 13;36(2):94-100. Abstract (http://www.ncbi.nlm.nih.gov/pubmed/35937435?tool=bestpractice.bmj.com)

21. Bentley H, Yuen J, Roberts J, et al. Underreported and underrecognized: a comprehensive imaging review of breast injury. Emerg Radiol. 2023 Dec;30(6):777-89. Abstract (http://www.ncbi.nlm.nih.gov/pubmed/37943412?tool=bestpractice.bmj.com)

22. Song CT, Teo I, Song C. Systematic review of seat-belt trauma to the female breast: a new diagnosis and management classification. J Plast Reconstr Aesthet Surg. 2015 Mar;68(3):382-9. Abstract (http://www.ncbi.nlm.nih.gov/pubmed/25586018?tool=bestpractice.bmj.com)

23. Baker TP, Lenert JT, Parker J, et al. Lactating adenoma: a diagnosis of exclusion. Breast J. 2001 Sep-Oct;7(5):354-7. Abstract (http://www.ncbi.nlm.nih.gov/pubmed/11906446?tool=bestpractice.bmj.com)

24. Beute BJ, Kalisher L, Hutter RV. Lobular carcinoma in situ of the breast: clinical, pathologic, and mammographic features. AJR Am J Roentgenol. 1991 Aug;157(2):257-65. Full text (http://www.ajronline.org/doi/pdf/10.2214/ajr.157.2.1853802) Abstract (http://www.ncbi.nlm.nih.gov/pubmed/1853802?tool=bestpractice.bmj.com)

25. Winchester DP, Jeske JM, Goldschmidt RA. The diagnosis and management of ductal carcinoma in-situ of the breast. CA Cancer J Clin. 2000 May-Jun;50(3):184-200. Full text (http://onlinelibrary.wiley.com/doi/10.3322/canjclin.50.3.184/full) Abstract (http://www.ncbi.nlm.nih.gov/pubmed/10901741?tool=bestpractice.bmj.com)

26. Barber Z, Kosti A, Jones C. Breast metastases from primary lung cancer. BMJ. 2017 Apr 6;357:j1203. Abstract (http://www.ncbi.nlm.nih.gov/pubmed/28385734?tool=bestpractice.bmj.com)

27. Choudhery S, Xiao L, Zingula S. Review of nonmammary metastases to the breast: imaging and clinical presentation. Curr Probl Diagn Radiol. 2021 Jul-Aug;50(4):495-8. Abstract (http://www.ncbi.nlm.nih.gov/pubmed/32534793?tool=bestpractice.bmj.com)

28. DeLair DF, Corben AD, Catalano JP, et al. Non-mammary metastases to the breast and axilla: a study of 85 cases. Mod Pathol. 2013 Mar;26(3):343-9. Full text (https://www.modernpathology.org/article/S0893-3952(22)03434-2/fulltext) Abstract (http://www.ncbi.nlm.nih.gov/pubmed/23174933?tool=bestpractice.bmj.com)

29. Public Health England. NHS breast screening programme clinical guidance for breast cancer screening assessment. Nov 2016 [internet publication]. Full text (https://

assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/567600/Clinical_guidance_for_breast__cancer_screening__assessment_Nov_2016.pdf)

30. Winchester DJ, Bernstein JR, Jeske JM, et al. Upstaging of atypical ductal hyperplasia after vacuum-assisted 11-gauge stereotactic core needle biopsy. Arch Surg. 2003 Jun;138(6):619-22. Full text (http://archsurg.jamanetwork.com/article.aspx?articleid=394912) Abstract (http://www.ncbi.nlm.nih.gov/pubmed/12799332?tool=bestpractice.bmj.com)

31. Guth U, Huang DJ, Huber M, et al. Tumor size and detection in breast cancer: self-examination and clinical breast examination are at their limit. Cancer Detect Prev. 2008;32(3):224-8. Abstract (http://www.ncbi.nlm.nih.gov/pubmed/18790576?tool=bestpractice.bmj.com)

32. Breen N, Yabroff KR, Meissner HI. What proportion of breast cancers are detected by mammography in the United States? Cancer Detect Prev. 2007;31(3):220-4. Abstract (http://www.ncbi.nlm.nih.gov/pubmed/17573202?tool=bestpractice.bmj.com)

33. Benson JR, Jatoi I, Keisch M, et al. Early breast cancer. Lancet. 2009 Apr 25;373(9673):1463-79. Abstract (http://www.ncbi.nlm.nih.gov/pubmed/19394537?tool=bestpractice.bmj.com)

34. National Cancer Institute. Cancer stat facts: female breast cancer. 2024 [internet publication]. Full text (https://seer.cancer.gov/statfacts/html/breast.html)

35. Lynch HT, Silva E, Snyder C, et al. Hereditary breast cancer - part I: diagnosing hereditary breast cancer syndromes. Breast J. 2008 Jan-Feb;14(1):3-13. Abstract (http://www.ncbi.nlm.nih.gov/pubmed/18086272?tool=bestpractice.bmj.com)

36. Hu C, Hart SN, Gnanaolivu R, et al. A population-based study of genes previously implicated in breast cancer. N Engl J Med. 2021 Feb 4;384(5):440-51. Full text (https://www.nejm.org/doi/10.1056/NEJMoa2005936) Abstract (http://www.ncbi.nlm.nih.gov/pubmed/33471974?tool=bestpractice.bmj.com)

37. National Comprehensive Cancer Network. Genetic/familial high-risk assessment: breast, ovarian, pancreatic and prostate [internet publication]. Full text (https://www.nccn.org/guidelines/category_1)

38. Dupont WD, Page DL. Risk factors for breast cancer in women with proliferative breast disease. N Engl J Med. 1985 Jan 17;312(3):146-51. Abstract (http://www.ncbi.nlm.nih.gov/pubmed/3965932?tool=bestpractice.bmj.com)

39. Marshall LM, Hunter DJ, Connolly JL, et al. Risk of breast cancer associated with atypical hyperplasia of lobular and ductal types. Cancer Epidemiol Biomarkers Prev. 1997 May;6(5):297-301. Full text (http://cebp.aacrjournals.org/content/6/5/297.full.pdf+html) Abstract (http://www.ncbi.nlm.nih.gov/pubmed/9149887?tool=bestpractice.bmj.com)

40. Sakorafas GH, Krespis E, Pavlakis G. Risk estimation for breast cancer development; a clinical perspective. Surg Oncol. 2002 May;10(4):183-92. Abstract (http://www.ncbi.nlm.nih.gov/pubmed/12020673?tool=bestpractice.bmj.com)

41. National Institute for Health and Care Excellence. Menopause: diagnosis and management. Nov 2024 [internet publication]. Full text (https://www.nice.org.uk/guidance/ng23)

42. de Villiers TJ, Hall JE, Pinkerton JV, et al. Revised global consensus statement on menopausal hormone therapy. Climacteric. 2016 Aug;19(4):313-5. Abstract (http://www.ncbi.nlm.nih.gov/pubmed/27322027?tool=bestpractice.bmj.com)

43. Ross RK, Paganini-Hill A, Wan PC, et al. Effect of hormone replacement therapy on breast cancer risk: estrogen versus estrogen plus progestin. J Natl Cancer Inst. 2000 Feb 16;92(4):328-32. Full text (http://jnci.oxfordjournals.org/content/92/4/328.full) Abstract (http://www.ncbi.nlm.nih.gov/pubmed/10675382?tool=bestpractice.bmj.com)

44. Rossouw JE, Anderson GL, Prentice RL, et al. Risks and benefits of estrogen plus progestin in healthy postmenopausal women: principal results from the Women's Health Initiative randomized controlled trial. JAMA. 2002 Jul 17;288(3):321-33. Full text (https://jamanetwork.com/journals/jama/fullarticle/195120) Abstract (http://www.ncbi.nlm.nih.gov/pubmed/12117397?tool=bestpractice.bmj.com)

45. Collaborative Group on Hormonal Factors in Breast Cancer. Type and timing of menopausal hormone therapy and breast cancer risk: individual participant meta-analysis of the worldwide epidemiological evidence. Lancet. 2019 Sep 28;394(10204):1159-68. Full text (https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(19)31709-X/fulltext) Abstract (http://www.ncbi.nlm.nih.gov/pubmed/31474332?tool=bestpractice.bmj.com)

46. Chlebowski RT, Anderson GL, Aragaki AK, et al. Association of menopausal hormone therapy with breast cancer incidence and mortality during long-term follow-up of the Women's Health Initiative randomized clinical trials. JAMA. 2020 Jul 28;324(4):369-80. Full text (https://jamanetwork.com/journals/jama/fullarticle/2768806) Abstract (http://www.ncbi.nlm.nih.gov/pubmed/32721007?tool=bestpractice.bmj.com)

47. Advani SM, Zhu W, Demb J, et al. Association of breast density with breast cancer risk among women aged 65 years or older by age group and body mass index. JAMA Netw Open. 2021 Aug 2;4(8):e2122810. Full text (https://jamanetwork.com/journals/jamanetworkopen/fullarticle/2783508) Abstract (http://www.ncbi.nlm.nih.gov/pubmed/34436608?tool=bestpractice.bmj.com)

48. Shapley M, Mansell G, Jordan JL, et al. Positive predictive values of ≥5% in primary care for cancer: systematic review. Br J Gen Pract. 2010 Sep;60(578):e366-77. Abstract (http://www.ncbi.nlm.nih.gov/pubmed/20849687?tool=bestpractice.bmj.com)

49. Hindle WH. Breast mass evaluation. Clin Obstet Gynecol. 2002 Sep;45(3):750-7. Abstract (http://www.ncbi.nlm.nih.gov/pubmed/12370615?tool=bestpractice.bmj.com)

50. Goodson WH 3rd, Hunt TK, Plotnik JN, et al. Optimization of clinical breast examination. Am J Med. 2010 Apr;123(4):329-34. Abstract (http://www.ncbi.nlm.nih.gov/pubmed/20362752?tool=bestpractice.bmj.com)

51. American College of Radiology. ACR appropriateness criteria: palpable breast masses. 2022 [internet publication]. Full text (https://acsearch.acr.org/docs/69495/Narrative)

52. Malur S, Wurdinger S, Moritz A, et al. Comparison of written reports of mammography, sonography and magnetic resonance mammography for preoperative evaluation of breast lesions, with special emphasis on magnetic resonance mammography. Breast Cancer Res. 2001;3(1):55-60. Full text

(https://www.doi.org/10.1186/bcr271) Abstract (http://www.ncbi.nlm.nih.gov/pubmed/11250746?tool=bestpractice.bmj.com)

53. Kerlikowske K, Grady D, Rubin SM, et al. Efficacy of screening mammography: a meta-analysis. JAMA. 1995 Jan 11;273(2):149-54. Abstract (http://www.ncbi.nlm.nih.gov/pubmed/7799496?tool=bestpractice.bmj.com)

54. Kacl GM, Liu P, Debatin JF, et al. Detection of breast cancer with conventional mammography and contrast-enhanced MR imaging. Eur Radiol. 1998;8(2):194-200. Abstract (http://www.ncbi.nlm.nih.gov/pubmed/9477265?tool=bestpractice.bmj.com)

55. Bone B, Pentek Z, Perbeck L, et al. Diagnostic accuracy of mammography and contrast-enhanced MR imaging in 238 histologically verified breast lesions. Acta Radiol. 1997 Jul;38(4 pt 1):489-96. Abstract (http://www.ncbi.nlm.nih.gov/pubmed/9240665?tool=bestpractice.bmj.com)

56. National Institute for Health and Care Excellence. Suspected cancer: recognition and referral. May 2025 [internet publication]. Full text (https://www.nice.org.uk/guidance/ng12)

57. Kerlikowske K, Smith-Bindman R, Ljung BM, et al. Evaluation of abnormal mammography results and palpable breast abnormalities. Ann Intern Med. 2003 Aug 19;139(4):274-84. Abstract (http://www.ncbi.nlm.nih.gov/pubmed/12965983?tool=bestpractice.bmj.com)

58. American College of Radiology. Breast imaging reporting & data system (BI-RADS®). 2013 [internet publication]. Full text (https://www.acr.org/Clinical-Resources/Reporting-and-Data-Systems/Bi-Rads)

59. Cox B, Ballard-Barbash R, Broeders M, et al; International Cancer Screening Network. Recording of hormone therapy and breast density in breast screening programs: summary and recommendations of the International Cancer Screening Network. Breast Cancer Res Treat. 2010 Dec;124(3):793-800. Abstract (http://www.ncbi.nlm.nih.gov/pubmed/20414718?tool=bestpractice.bmj.com)

60. Woods RW, Sisney GS, Salkowski LR, et al. The mammographic density of a mass is a significant predictor of breast cancer. Radiology. 2011 Feb;258(2):417-25. Abstract (http://www.ncbi.nlm.nih.gov/pubmed/21177388?tool=bestpractice.bmj.com)

61. American College of Radiology. ACR practice parameter for the performance of a diagnostic breast ultrasound examination. 2021 [internet publication]. Full text (https://www.acr.org/-/media/ACR/Files/Practice-Parameters/US-Breast.pdf?la=en)

62. Kolb TM, Lichy J, Newhouse JH. Comparison of the performance of screening mammography, physical examination, and breast US and evaluation of factors that influence them: an analysis of 27,825 patient evaluations. Radiology. 2002 Oct;225(1):165-75. Full text (http://pubs.rsna.org/doi/full/10.1148/radiol.2251011667) Abstract (http://www.ncbi.nlm.nih.gov/pubmed/12355001?tool=bestpractice.bmj.com)

63. Max MH, Klamer TW. Breast cancer in 120 women under 35 years old: a 10-year community-wide survey. Am Surg. 1984 Jan;50(1):23-5. Abstract (http://www.ncbi.nlm.nih.gov/pubmed/6691629?tool=bestpractice.bmj.com)

64. Loibl S, André F, Bachelot T, et al. Early breast cancer: ESMO Clinical Practice Guideline for diagnosis, treatment and follow-up. Ann Oncol. 2023 Dec 8 [Epub ahead of print]. Full text (https://www.annalsofoncology.org/article/S0923-7534(23)05104-9/fulltext) Abstract (http://www.ncbi.nlm.nih.gov/pubmed/38101773?tool=bestpractice.bmj.com)

65. American College of Radiology. ACR practice parameter for the performance of ultrasound-guided percutaneous breast interventional procedures. 2021 [internet publication]. Full text (https://www.acr.org/-/media/ACR/Files/Practice-Parameters/US-GuidedBreast.pdf?la=en)

66. US Preventive Services Task Force, Nicholson WK, Silverstein M, et al. Screening for breast cancer: US Preventive Services Task Force recommendation statement. JAMA. 2024 Jun 11;331(22):1918-30. Full text (https://jamanetwork.com/journals/jama/fullarticle/2818283) Abstract (http://www.ncbi.nlm.nih.gov/pubmed/38687503?tool=bestpractice.bmj.com)

67. Chen X, Li WL, Zhang YL, et al. Meta-analysis of quantitative diffusion-weighted MR imaging in the differential diagnosis of breast lesions. BMC Cancer. 2010 Dec 29;10:693. Full text (http://www.biomedcentral.com/1471-2407/10/693) Abstract (http://www.ncbi.nlm.nih.gov/pubmed/21189150?tool=bestpractice.bmj.com)

68. Akçil M, Karaağaoğlu E, Demirhan B. Diagnostic accuracy of fine-needle aspiration cytology of palpable breast masses: an SROC curve with fixed and random effects linear meta-regression models. Diagn Cytopathol. 2008 May;36(5):303-10. Abstract (http://www.ncbi.nlm.nih.gov/pubmed/18418880?tool=bestpractice.bmj.com)

69. Yu YH, Wei W, Liu JL. Diagnostic value of fine-needle aspiration biopsy for breast mass: a systematic review and meta-analysis. BMC Cancer. 2012 Jan 25;12:41. Full text (http://www.biomedcentral.com/1471-2407/12/41) Abstract (http://www.ncbi.nlm.nih.gov/pubmed/22277164?tool=bestpractice.bmj.com)

70. Yu YH, Liang C, Yuan XZ. Diagnostic value of vacuum-assisted breast biopsy for breast carcinoma: a meta-analysis and systematic review. Breast Cancer Res Treat. 2010 Apr;120(2):469-79. Abstract (http://www.ncbi.nlm.nih.gov/pubmed/20130983?tool=bestpractice.bmj.com)

71. National Institute for Health and Care Excellence. Image-guided radiofrequency excision biopsy of breast lesions. Jul 2009 [internet publication]. Full text (http://www.nice.org.uk/guidance/IPG308)

72. Hahn M, Krainick-Strobel U, Toellner T, et al. Interdisciplinary consensus recommendations for the use of vacuum-assisted breast biopsy under sonographic guidance: first update 2012. Ultraschall Med. 2012 Aug;33(4):366-71. Abstract (http://www.ncbi.nlm.nih.gov/pubmed/22723042?tool=bestpractice.bmj.com)

73. Hindle WH, Arias RD, Florentine B, et al. Lack of utility in clinical practice of cytologic examination of nonbloody cyst fluid from palpable breast cysts. Am J Obstet Gynecol. 2000 Jun;182(6):1300-5. Abstract (http://www.ncbi.nlm.nih.gov/pubmed/10871442?tool=bestpractice.bmj.com)

Images

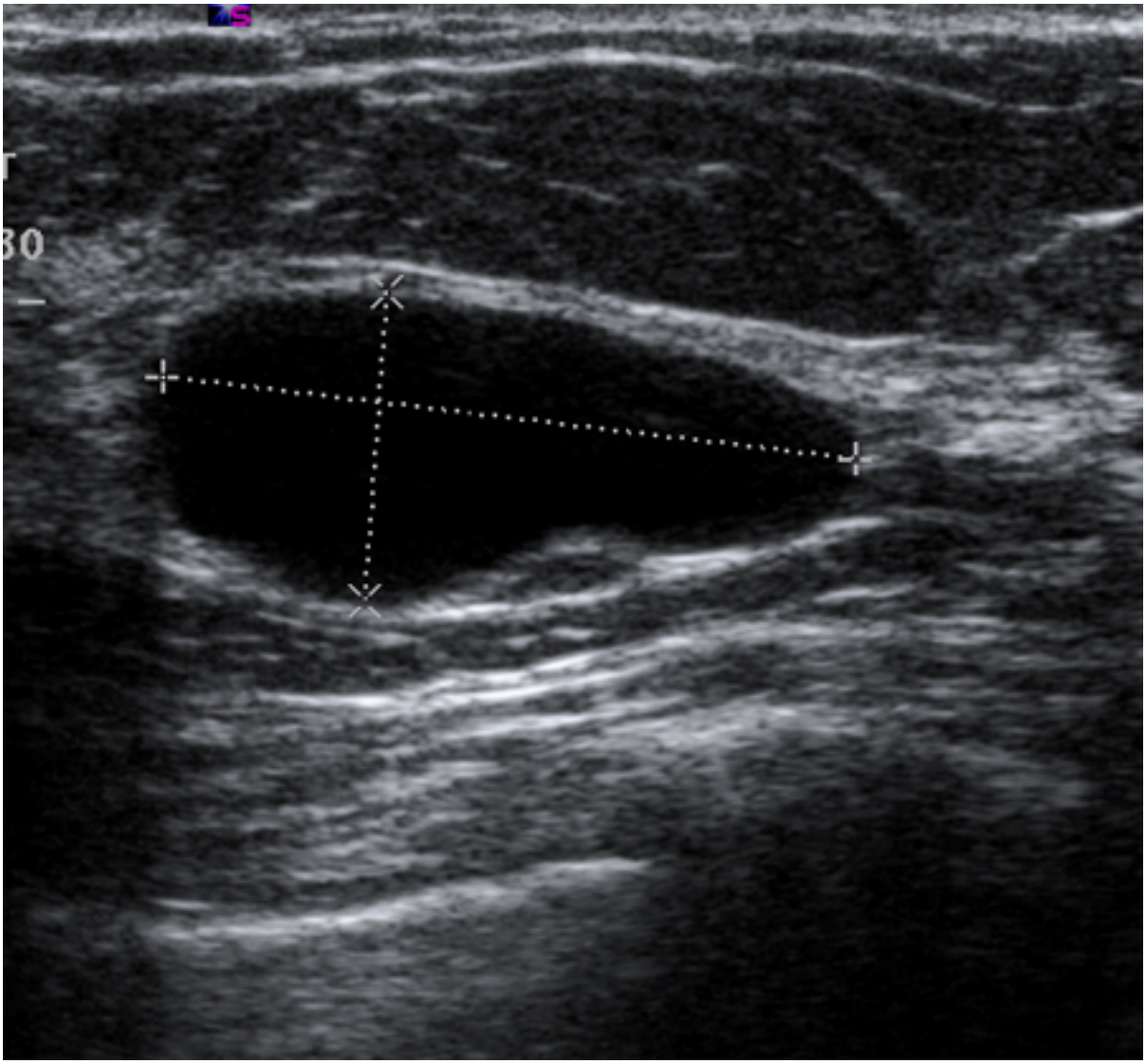


Figure 1: Ultrasonographic image of a simple cyst

Courtesy of Dr Lane Roland, University of Louisville; used with permission

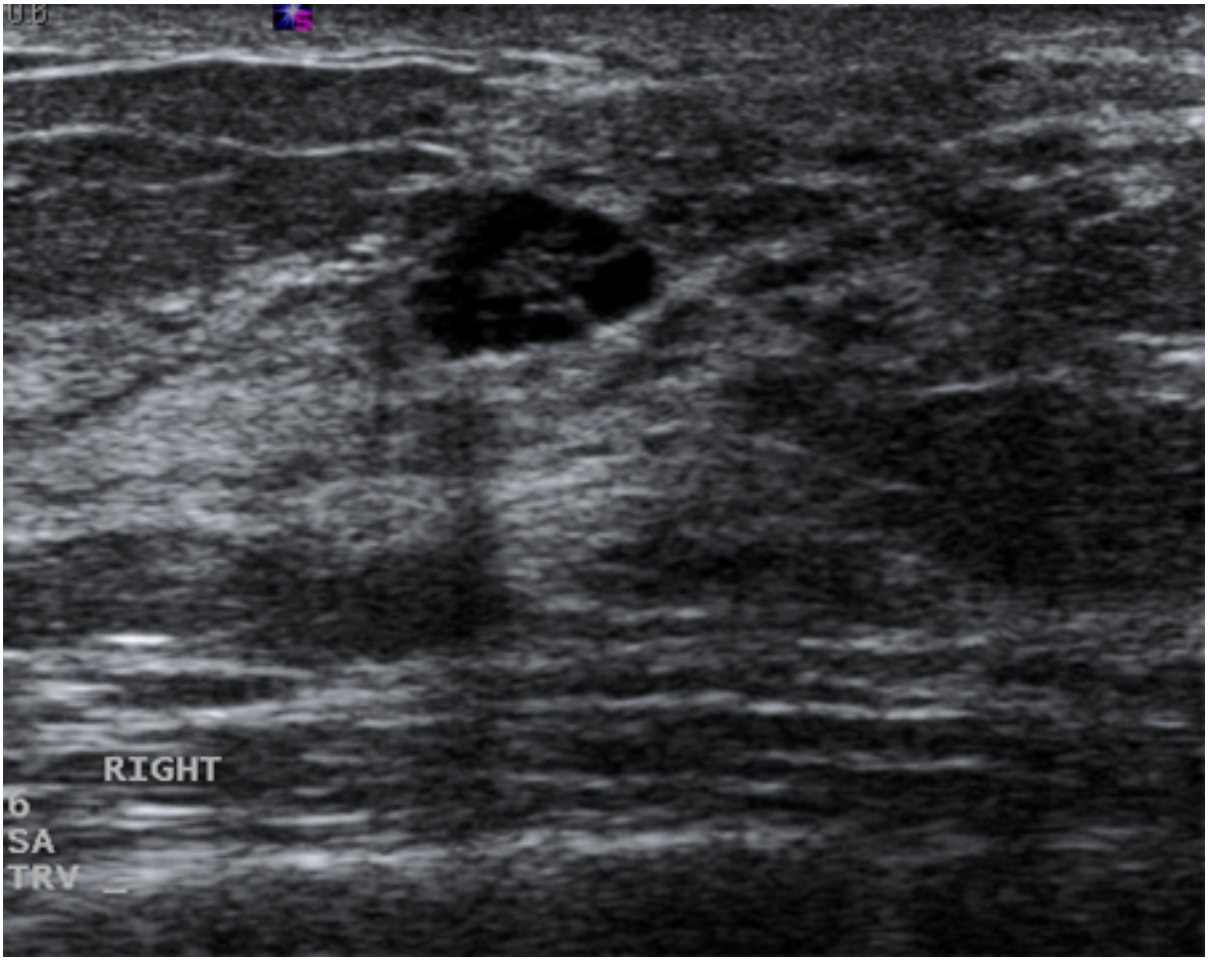


Figure 2: Ultrasonographic image of a complex cyst

Courtesy of Dr Lane Roland, University of Louisville; used with permission

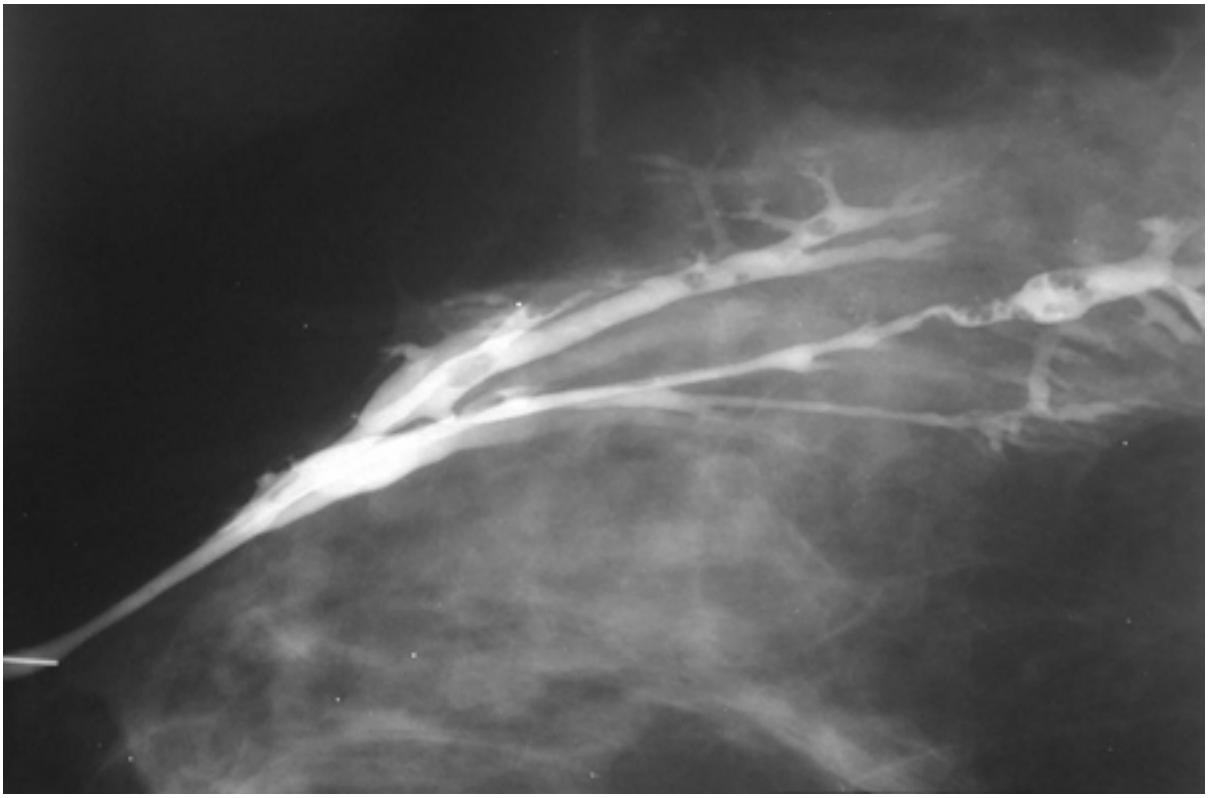


Figure 3: Ductogram demonstrating multiple intraductal papillomas

Courtesy of Dr Nancy Pile, University of Louisville; used with permission

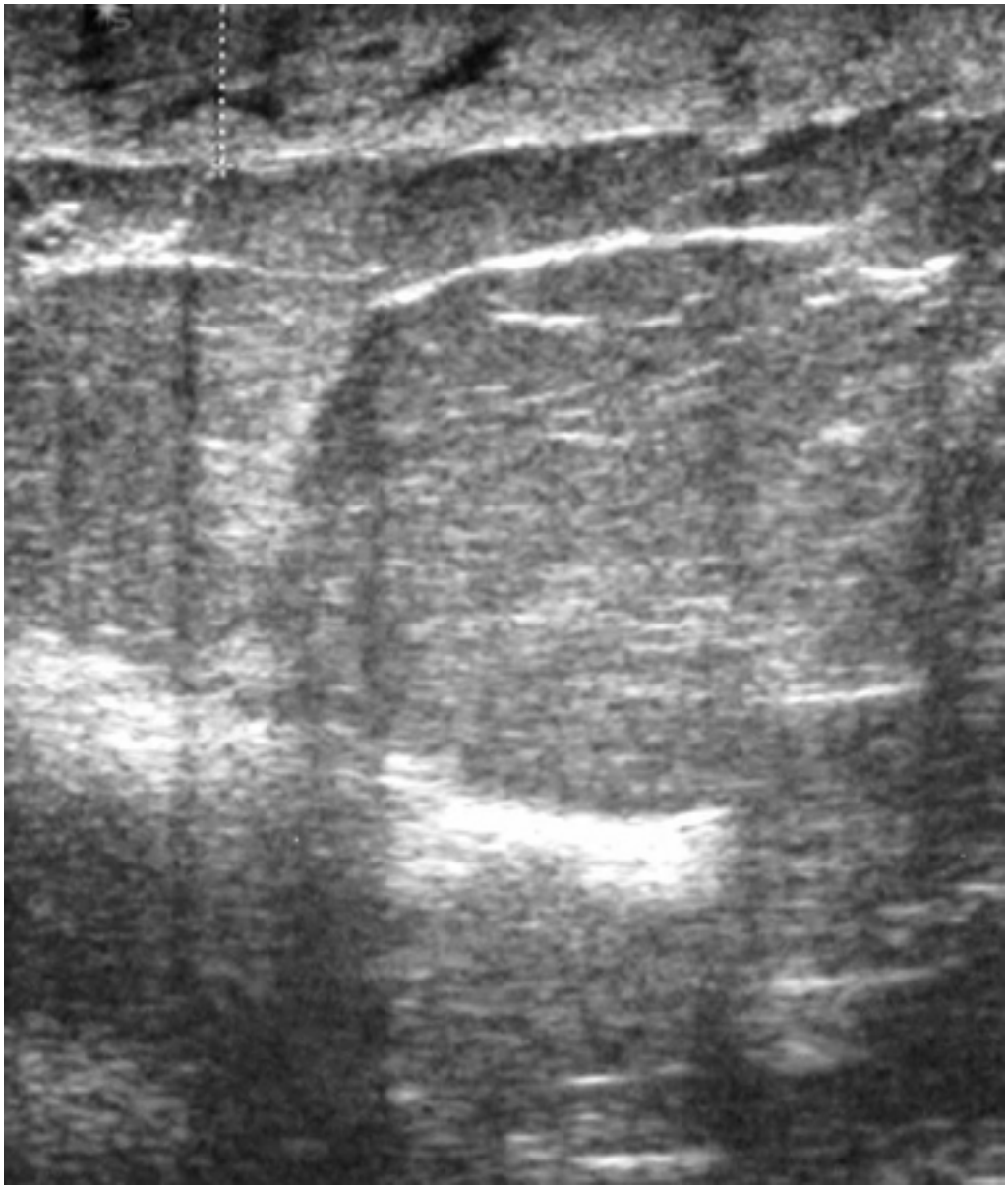


Figure 4: Ultrasonographic image of skin thickening in patient with inflammatory breast cancer

Courtesy of Dr Nancy Pile, University of Louisville; used with permission

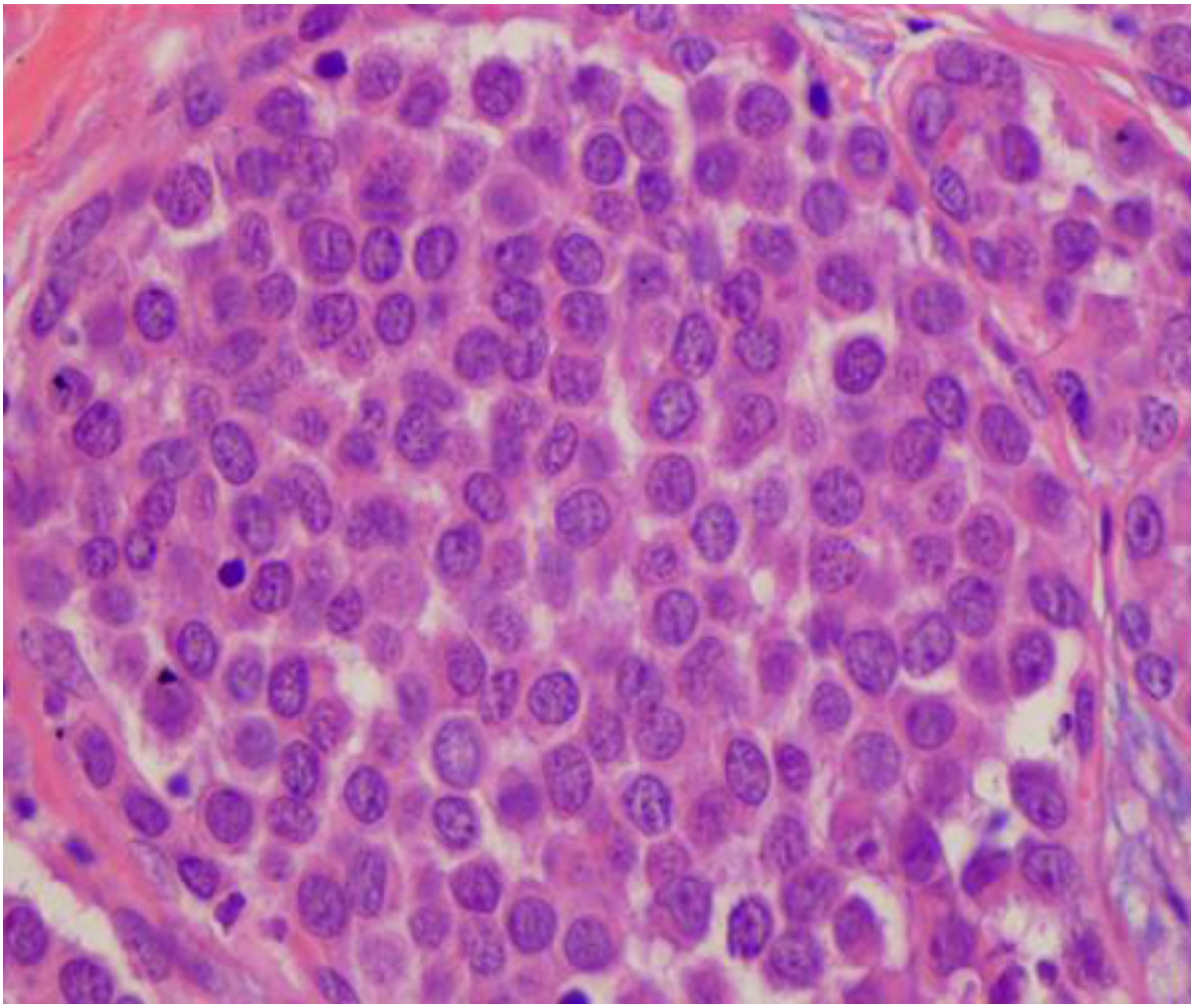


Figure 5: Histopathology of classic lobular carcinoma in situ (LCIS)

Courtesy of Dr Sunati Sahoo, University of Louisville; used with permission

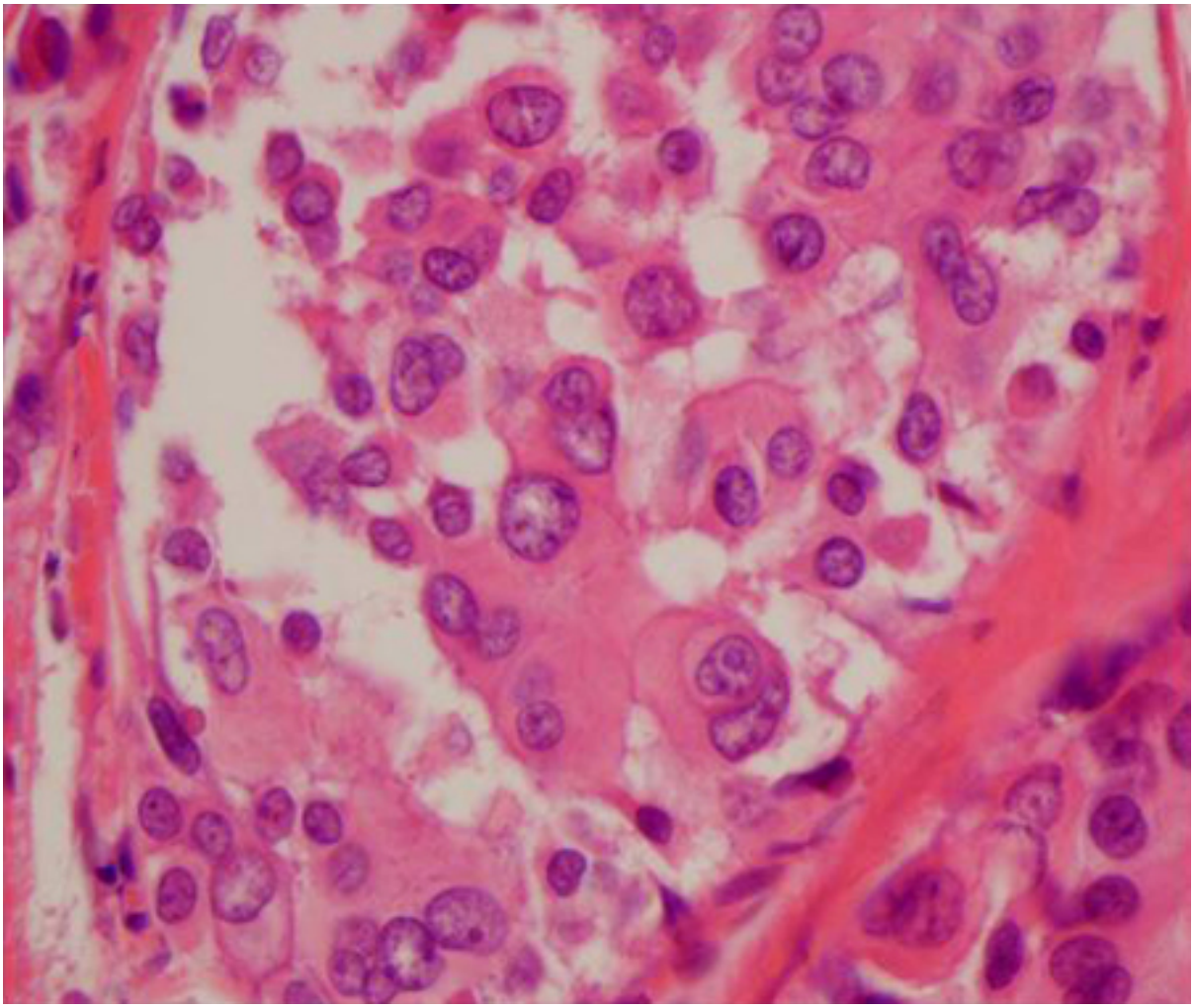


Figure 6: Histopathology of pleomorphic lobular carcinoma in situ (LCIS)

Courtesy of Dr Sunati Sahoo, University of Louisville; used with permission

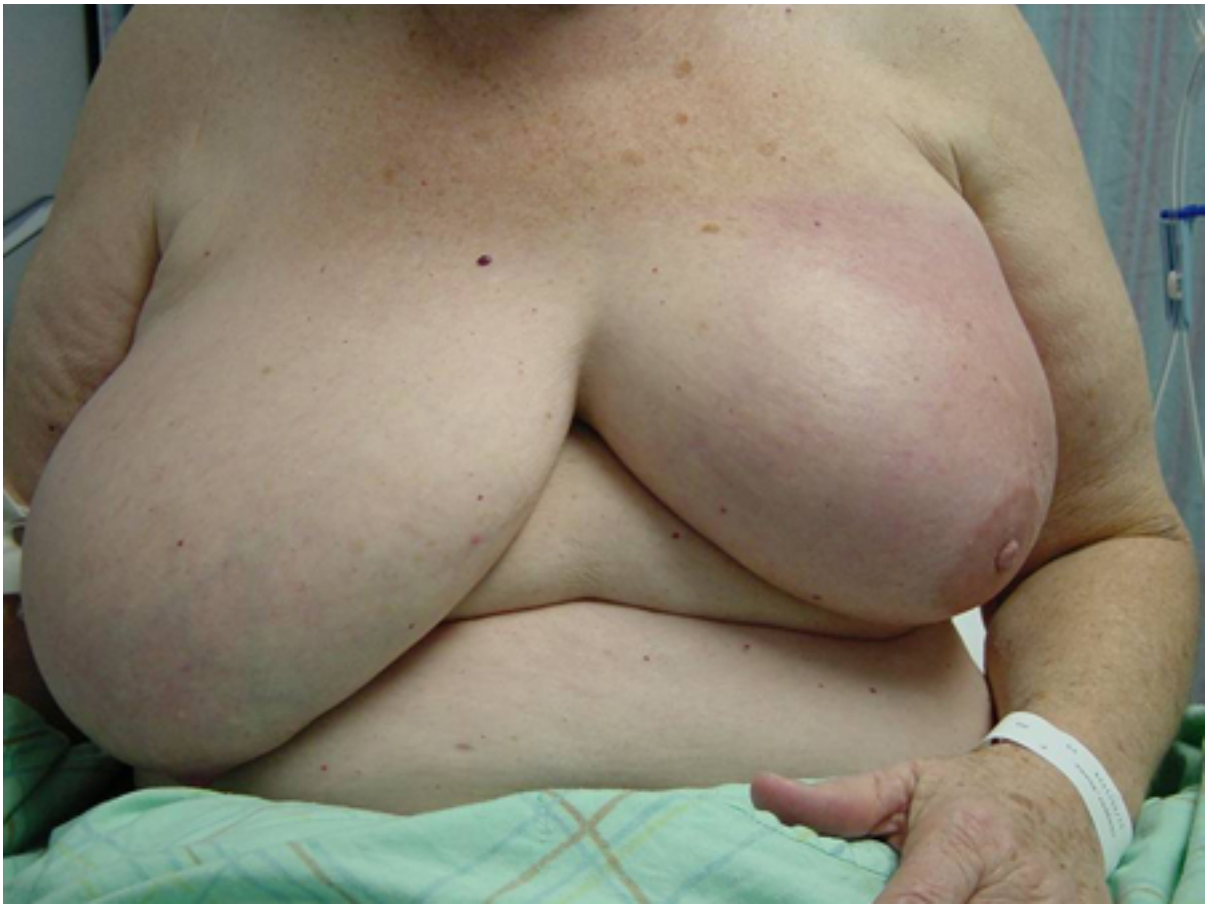


Figure 7: Patient with inflammatory breast cancer who presented with a shrinking breast

Courtesy of Dr Anees Chagpar

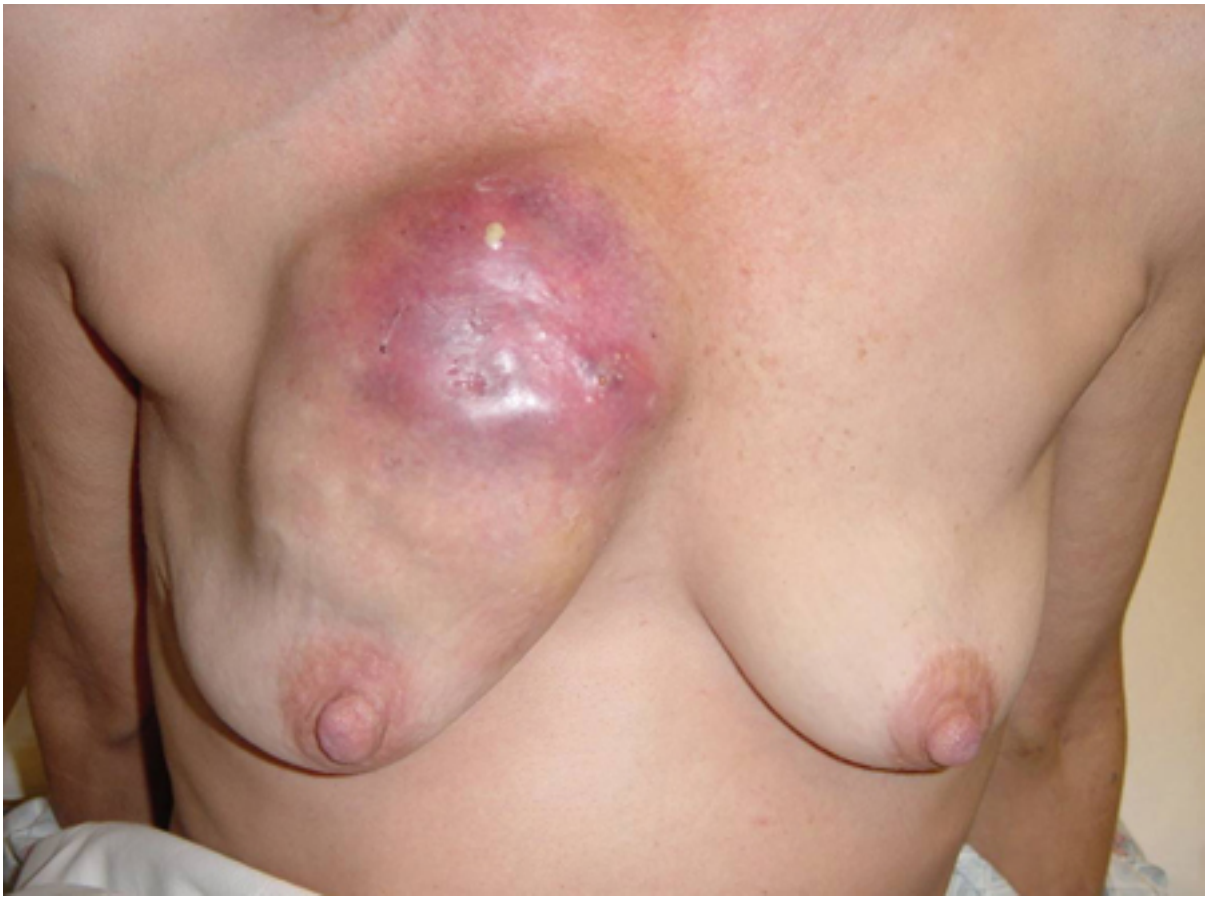


Figure 8: Obvious mass with skin involvement on right breast

Courtesy of Dr Anees Chagpar

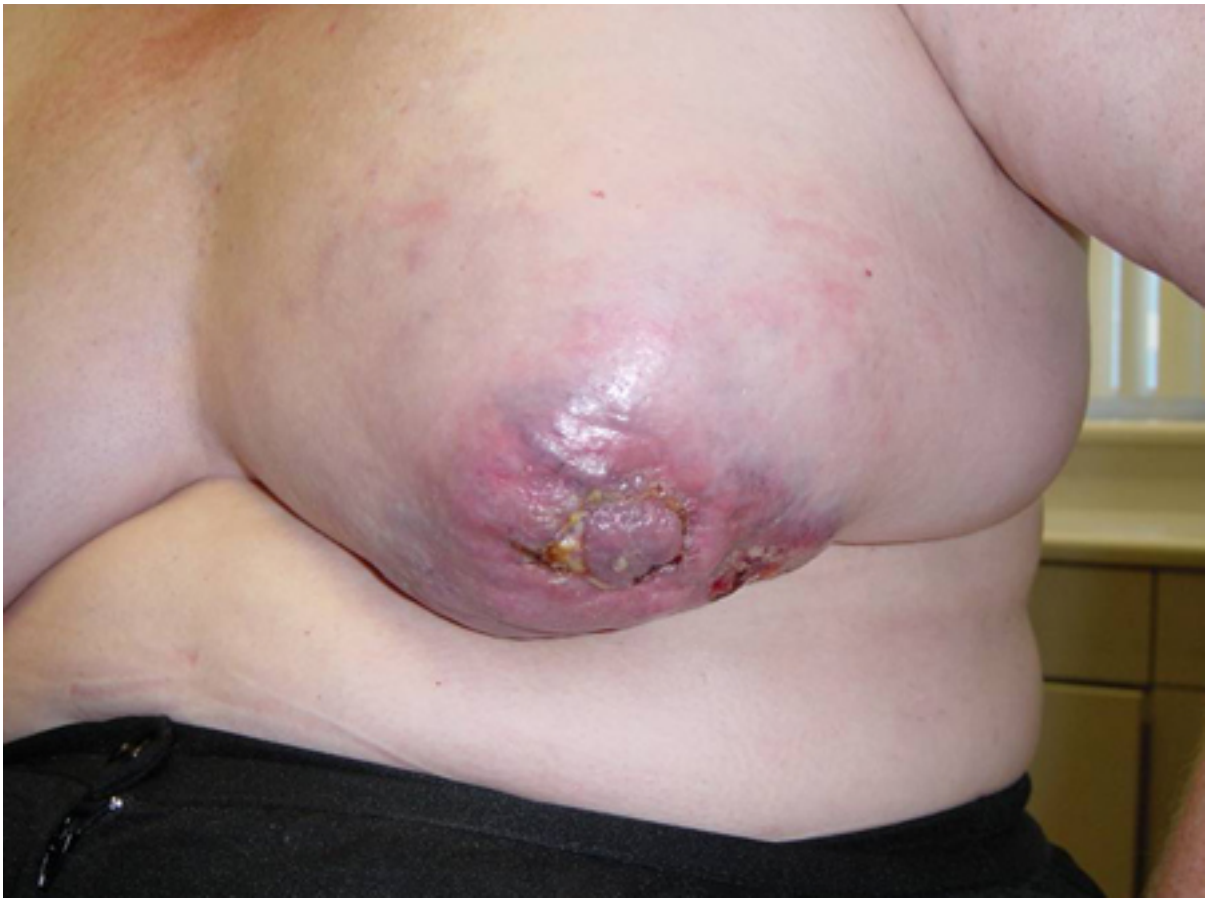


Figure 9: Obvious mass with skin involvement on left breast

Courtesy of Dr Anees Chagpar

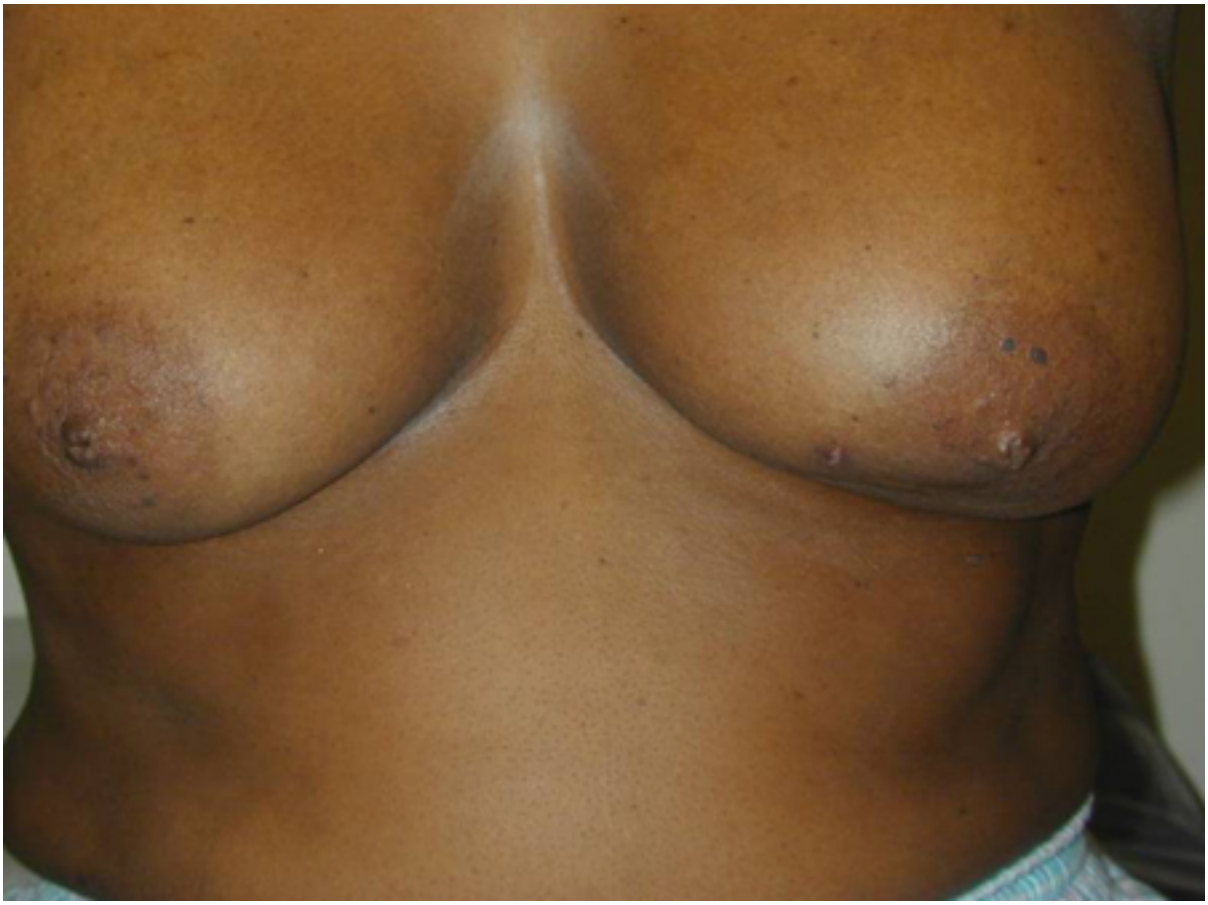


Figure 10: Patient with large breast mass and retraction at 6 o'clock of left breast, noted on elevating arms

Courtesy of Dr Anees Chagpar

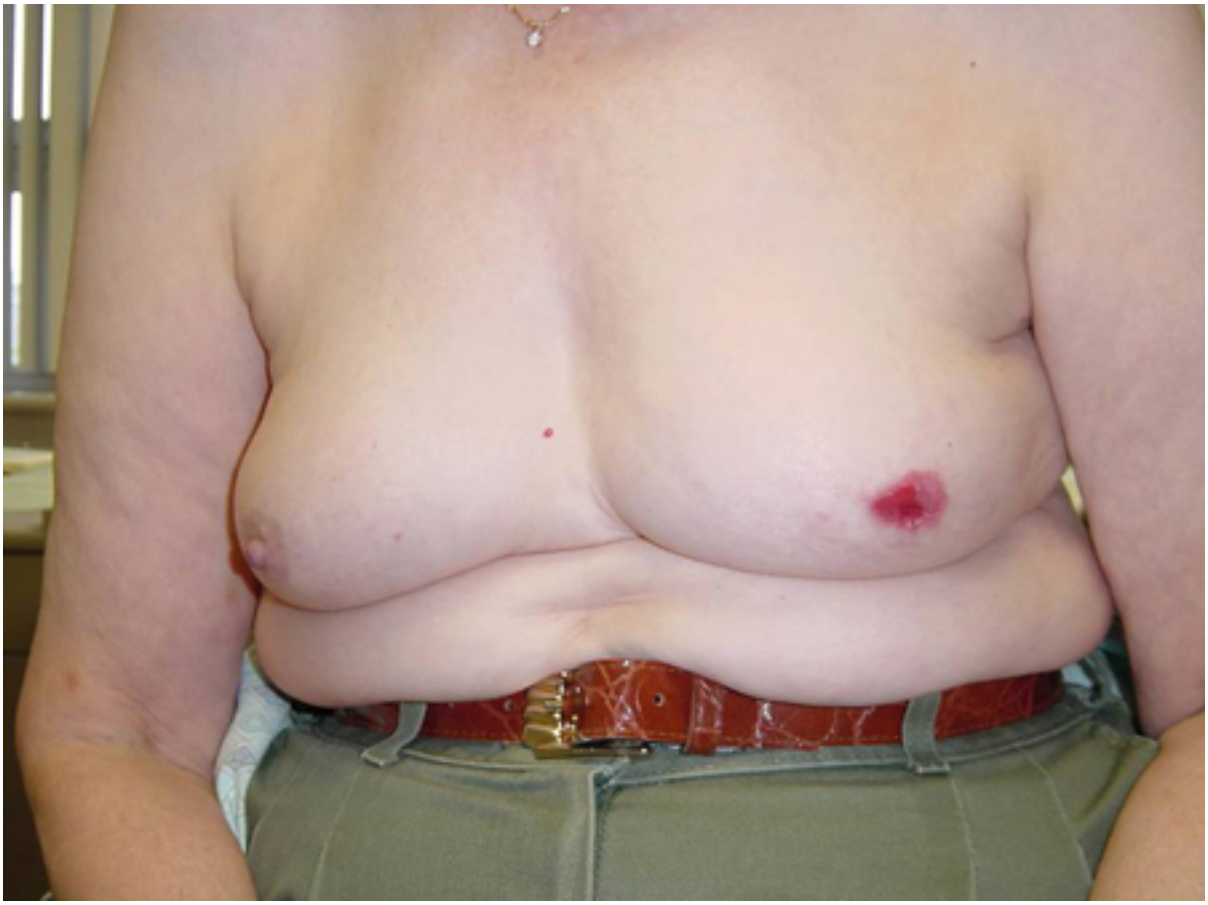


Figure 11: Excoriation of the nipple in a patient with Paget's disease

Courtesy of Dr Anees Chagpar

BIRADS Category	Description	Likelihood of Malignancy	Recommendation
0	Need more information	2-10%	Further imaging studies
1	Normal	0.05-0.1%	Routine screening mammography
2	Benign	0.05-0.1%	Routine screening mammography
3	Probably benign	0.3-1.8%	Short-term follow-up (6 months)
4	Highly suspicious	10-55%	Biopsy
5	Malignant	60-100%	Biopsy
6	Known cancer	100%	Treat malignancy

Figure 12: Breast Imaging Reporting and Data System (BIRADS) criteria

Courtesy of Dr Anees Chagpar

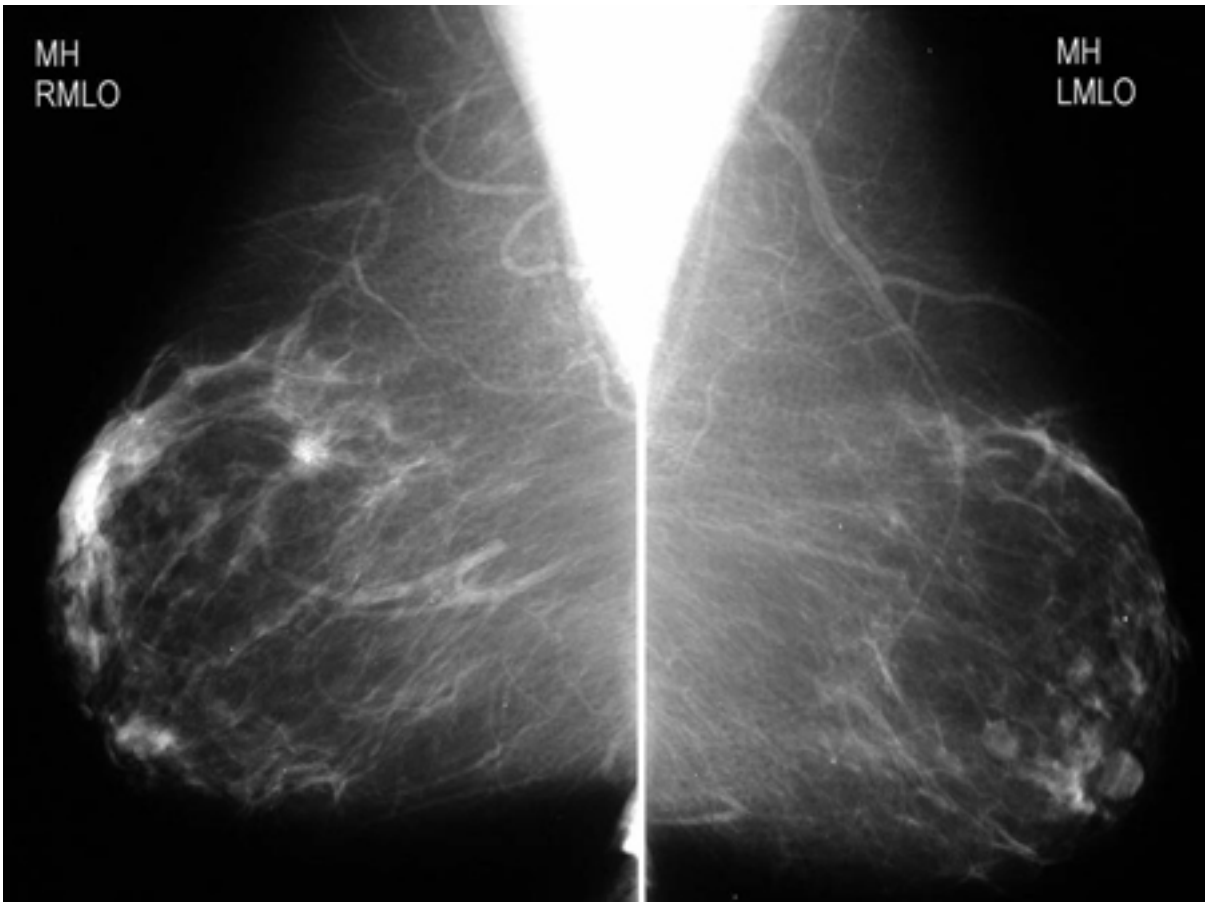


Figure 13: Screening mammogram demonstrating breast mass

Courtesy of Dr Nancy Pile, University of Louisville; used with permission

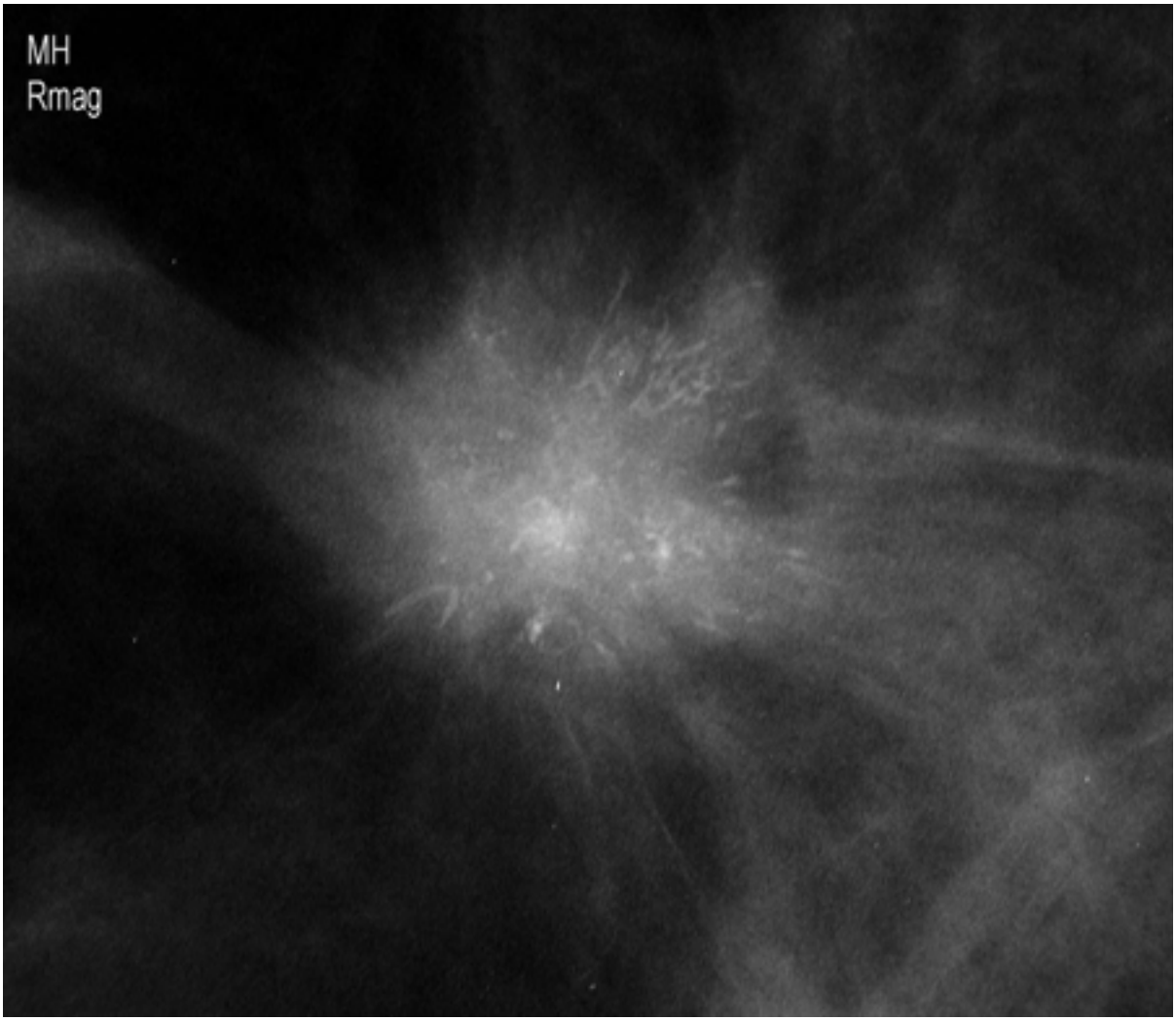


Figure 14: Magnification view demonstrating irregular spiculated mass with associated calcifications

Courtesy of Dr Nancy Pile, University of Louisville; used with permission

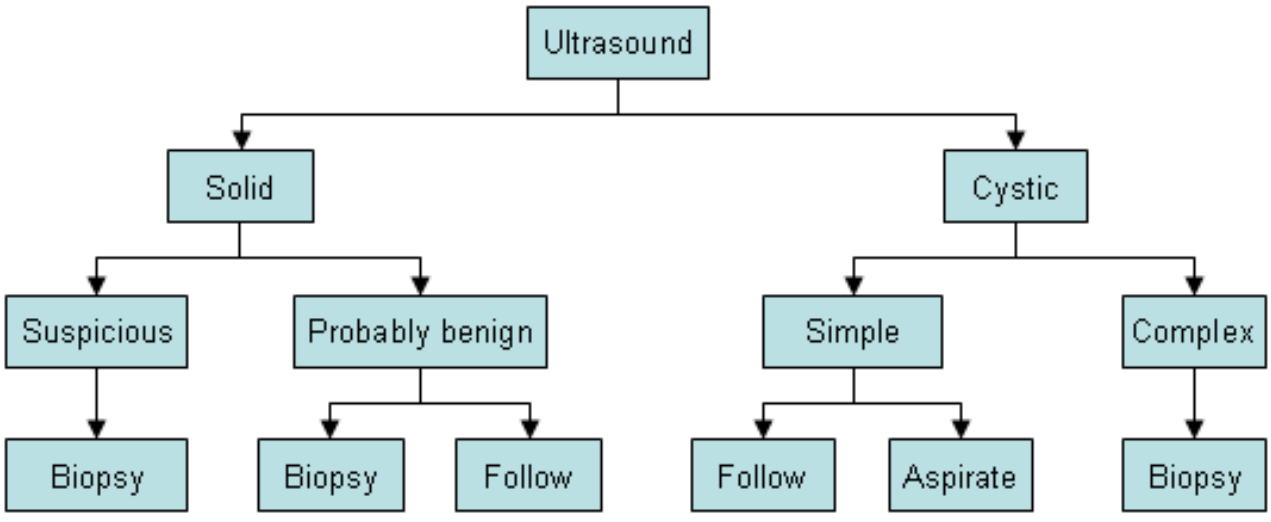


Figure 15: Diagnostic algorithm for breast ultrasound

Courtesy of Dr Anees Chagpar

Type of biopsy	Advantages	Disadvantages
FNA	Easy Relatively painless Office-based procedure Very small needle	Requires expert cytopathologist Unable to evaluate histology
Core needle	Easy Relatively painless Office-based procedure Standard histopathology Able to assess tissue architecture Able to obtain receptor status	Slightly larger needle
Excisional biopsy	Standard histopathology Able to assess tissue architecture Able to obtain receptor status	Requires procedure suite or operating room Larger incision More painful

Figure 16: Breast biopsy techniques (FNA; fine needle aspiration)

Courtesy of Dr Anees Chagpar

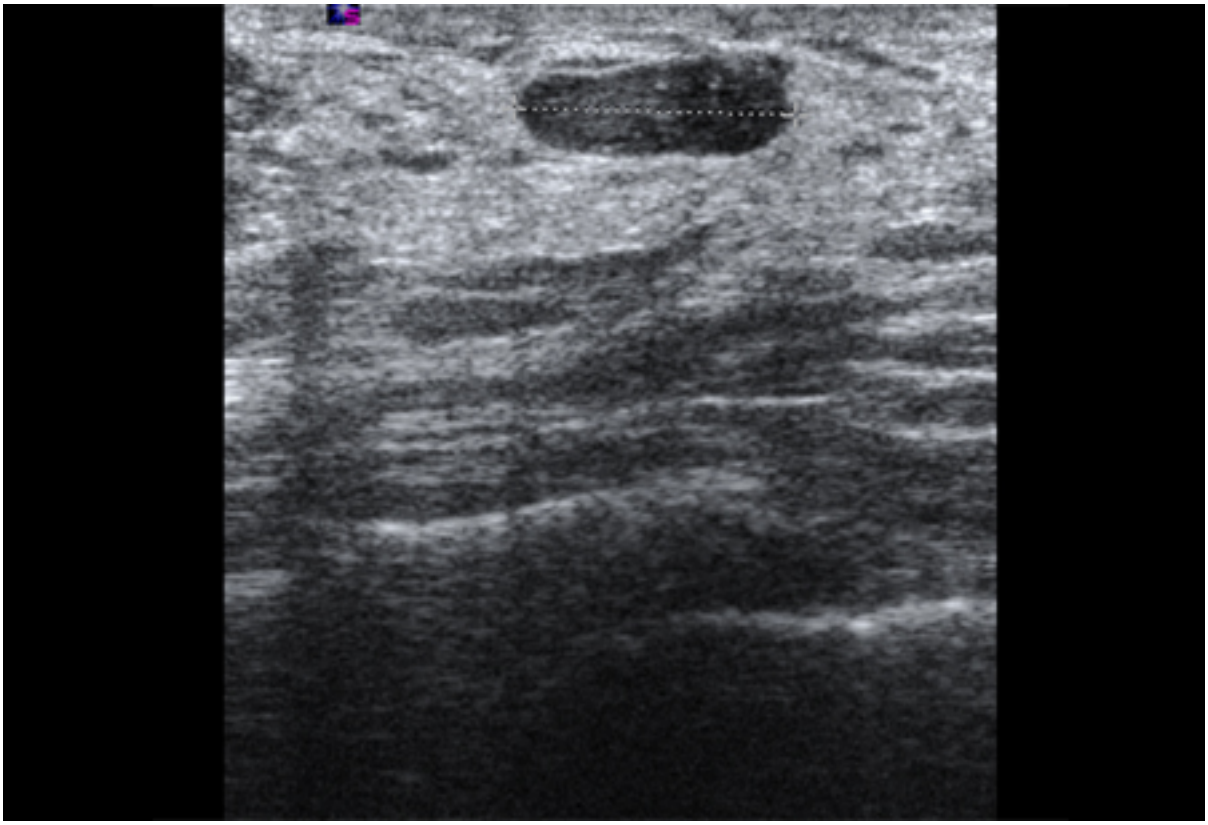


Figure 17: Ultrasonographic image of a fibroadenoma

Courtesy of Dr Lane Roland, University of Louisville; used with permission

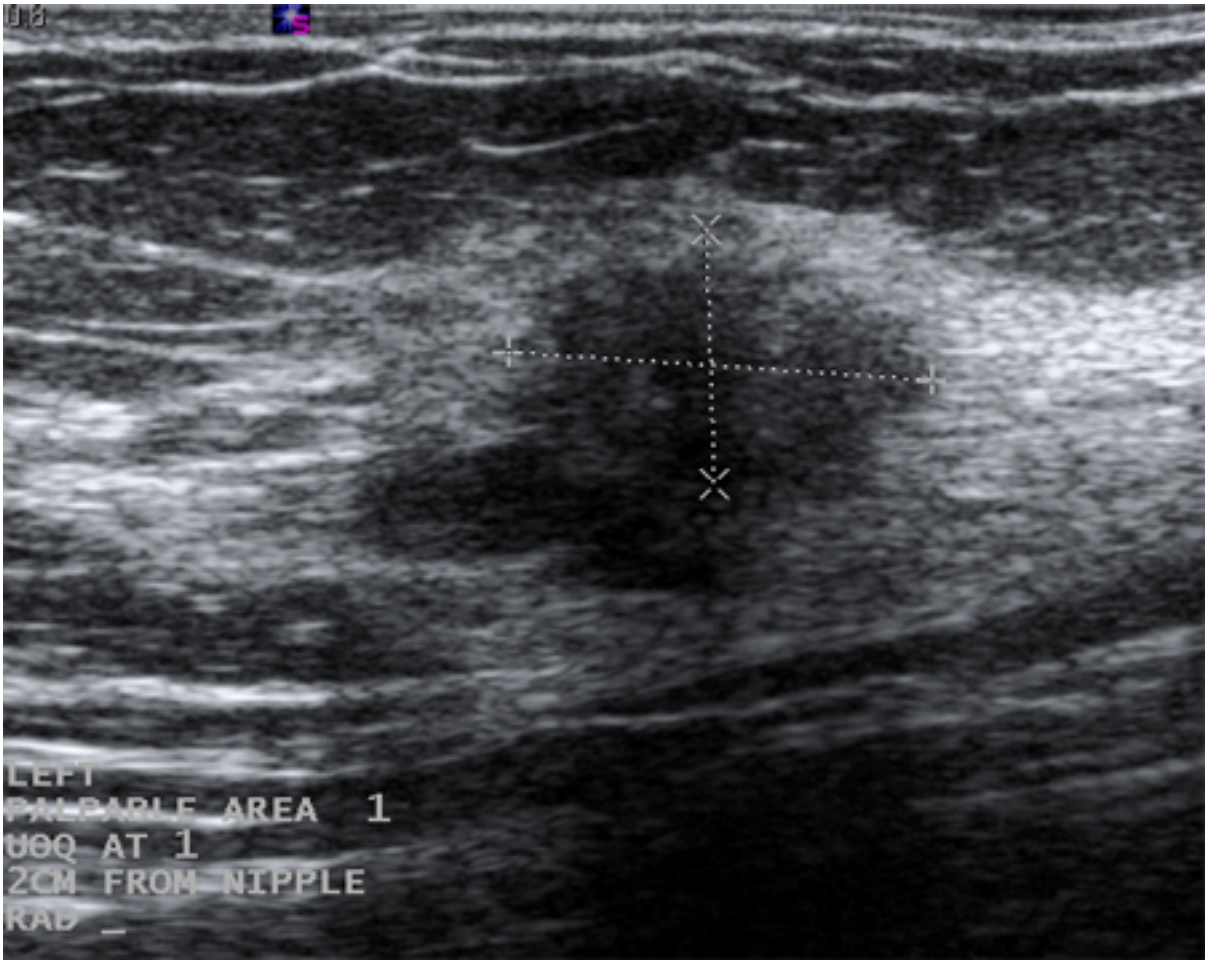


Figure 18: Ultrasonographic image of an invasive carcinoma

Courtesy of Dr Lane Roland, University of Louisville; used with permission

Disclaimer

BMJ Best Practice is intended for licensed medical professionals. BMJ Publishing Group Ltd (BMJ) does not advocate or endorse the use of any drug or therapy contained within this publication nor does it diagnose patients. As a medical professional you retain full responsibility for the care and treatment of your patients and you should use your own clinical judgement and expertise when using this product.

This content is not intended to cover all possible diagnosis methods, treatments, follow up, drugs and any contraindications or side effects. In addition, since such standards and practices in medicine change as new data become available, you should consult a variety of sources. We strongly recommend that you independently verify specified diagnosis, treatments and follow-up and ensure it is appropriate for your patient within your region. In addition, with respect to prescription medication, you are advised to check the product information sheet accompanying each drug to verify conditions of use and identify any changes in dosage schedule or contraindications, particularly if the drug to be administered is new, infrequently used, or has a narrow therapeutic range. You must always check that drugs referenced are licensed for the specified use and at the specified doses in your region.

Information included in BMJ Best Practice is provided on an “as is” basis without any representations, conditions or warranties that it is accurate and up to date. BMJ and its licensors and licensees assume no responsibility for any aspect of treatment administered to any patients with the aid of this information. To the fullest extent permitted by law, BMJ and its licensors and licensees shall not incur any liability, including without limitation, liability for damages, arising from the content. All conditions, warranties and other terms which might otherwise be implied by the law including, without limitation, the warranties of satisfactory quality, fitness for a particular purpose, use of reasonable care and skill and non-infringement of proprietary rights are excluded.

Where BMJ Best Practice has been translated into a language other than English, BMJ does not warrant the accuracy and reliability of the translations or the content provided by third parties (including but not limited to local regulations, clinical guidelines, terminology, drug names and drug dosages). BMJ is not responsible for any errors and omissions arising from translation and adaptation or otherwise.Where BMJ Best Practice lists drug names, it does so by recommended International Nonproprietary Names (rINNs) only. It is possible that certain drug formularies might refer to the same drugs using different names.

Please note that recommended formulations and doses may differ between drug databases drug names and brands, drug formularies, or locations. A local drug formulary should always be consulted for full prescribing information.

Treatment recommendations in BMJ Best Practice are specific to patient groups. Care is advised when selecting the integrated drug formulary as some treatment recommendations are for adults only, and external links to a paediatric formulary do not necessarily advocate use in children (and vice-versa). Always check that you have selected the correct drug formulary for your patient.

Where your version of BMJ Best Practice does not integrate with a local drug formulary, you should consult a local pharmaceutical database for comprehensive drug information including contraindications, drug interactions, and alternative dosing before prescribing.

Interpretation of numbers

Regardless of the language in which the content is displayed, numerals are displayed according to the original English-language numerical separator standard. For example 4 digit numbers shall not include a comma nor a decimal point; numbers of 5 or more digits shall include commas; and numbers stated to be less than 1 shall be depicted using decimal points. See Figure 1 below for an explanatory table.

BMJ accepts no responsibility for misinterpretation of numbers which comply with this stated numerical separator standard.

This approach is in line with the guidance of the International Bureau of Weights and Measures Service.

Figure 1 – BMJ Best Practice Numeral Style

5-digit numerals: 10,000

4-digit numerals: 1000

numerals < 1: 0.25

Our full website and application terms and conditions can be found here: Website Terms and Conditions.

Contact us

+ 44 (0) 207 111 1105
support@bmj.com

BMJ
BMA House
Tavistock Square
London
WC1H 9JR
UK

Contributors:

// Authors:

Marios-Konstantinos Tasoulis, MD, PhD

Consultant Breast Surgeon
Breast Surgery Unit, The Royal Marsden Hospital NHS Foundation Trust, London, UK
DISCLOSURES: M-KT declares that he has no competing interests.

Samantha Muktar, MBBS, FRCS (Eng), MSc, BMedSci

Consultant Breast Surgeon
Breast Surgery Unit, London North West University Healthcare, London, UK
DISCLOSURES: SM declares that she has no competing interests.

// Acknowledgements:

Dr Marios-Konstantinos Tasoulis would like to gratefully acknowledge Professor Anees Chagpar and Dr Matthew Bower, previous contributors to this topic.
DISCLOSURES: AC and MB declare that they have no competing interests.

// Peer Reviewers:

William Dooley, MD, FACS

Director of Surgical Oncology
Department of Surgery, University of Oklahoma, G. Rainey Williams Chair in Surgical Breast Oncology, OU Breast Institute, Oklahoma City, OK
DISCLOSURES: WD declares that he has no competing interests.

Jesus Solier Insuasty Enriquez, MD

Oncology Unit
Hospital Universitario Ramon Gonzalez Valencia, Bucaramanga, Colombia
DISCLOSURES: JE declares that he has no competing interests.

Justin Stebbing, MA, MRCP, MRCPath, PhD

Consultant Medical Oncologist/Senior Lecturer
Department of Medical Oncology, Imperial College/Imperial Healthcare NHS Trust, Charing Cross Hospital, London, UK
DISCLOSURES: JS declares that he has no competing interests.