Unilateral palpable male breast lesions: A diagnostic challenge for radiologists

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Learning objectives

1. To describe the mammographic and ultrasonographic characteristics of various benign and malignant male breast lesions, which present as unilateral palpable masses.

2. To highlight the clues to diagnosis and features allowing differentiation between benign and malignant lesions.

3. To suggest an algorithm for the work-up of unilateral palpable male breast lesions.

Background

The work-up of unilateral breast masses in men involves a large differential diagnosis, including the following: unilateral gynecomastia, lipoma, inclusion cyst, oil cyst, abscess, panniculitis, hematoma, fat necrosis, ductal ectasia, intraductal papilloma, cysts, carcinoma, sarcoma and metastatic disease. All unilateral breast lumps in men aged 50 years or older deserve investigation.

The most common cause of a male breast mass is gynecomastia, which is usually unilateral at clinical presentation and bilateral at imaging. Up to 30% of middle-aged men and 60% of men in their seventh decade have benign histologic gynecomastia. Male breast carcinoma represents less than 1% of all male breast diseases. Although most male breast carcinomas are clinically apparent, distinguishing early breast cancer from unilateral gynecomastia is considered a difficult task.

Imaging findings OR Procedure details

Mammographic and ultrasonographic imaging features of various male breast lesions that present as unilateral palpable masses are illustrated and the specific disease entities are reviewed.

Gynecomastia refers to the presence of a female-type mammary gland in the male. The prevalence of bilateral versus unilateral involvement is not really known and varies greatly in various reports. Gynecomastia is defined as an abnormal increase in the stromal and
ductal components of the male breast. This presents clinically as a palpable, discrete mass of 2cm or more in size in the subareolar region, which may be unilateral or bilateral. Approximately 85% of male breast masses are due to gynaecomastia, which is believed to be caused by a hormone imbalance with a relative excess of oestrogens.

**Mammographic and US Features**

The normal male breast consists of both fatty and fibrous tissue with a few duct-like structures in the subareolar region.

**Pseudogynecomastia** is due to the accumulation of fatty tissue which is easily differentiated from true gynecomastia by mammography. This typically demonstrates an enlarged breast filled with radiolucent fat only.

In **true gynecomastia**, the presence of a few duct-like structures, mainly in the subareolar region, represents the earliest mammographic abnormality. With progression of the disease, a generalized increase in density is seen to occupy either the subareolar region alone, or most of the breast. This may be homogeneous or non-homogeneous. The hallmark of gynecomastia is its central symmetric location under the nipple.

Three mammographic patterns of gynecomastia have been described representing various degrees and stages of ductal and stromal proliferation. They are the nodular, dendritic and diffuse glandular patterns.

1) **Early nodular gynecomastia** on page 7 is seen in patients with gynecomastia for less than 1 year. The majority of patients who seek medical attention will present with nipple tenderness or a palpable lump, which has persisted for months.

At mammography, there is nodular subareolar density. At US, there is a subareolar fan- or disk-shaped hypoechoic nodule surrounded by normal fatty tissue. Hypervascularity can be seen secondary to stromal proliferation. The typical mammographic appearance of gynecomastia usually confirms the diagnosis and requires no further imaging work-up. In cases of equivocal clinical and mammographic findings, US or follow-up evaluation should be considered.

2) **Chronic dendritic gynecomastia** is seen in patients with gynecomastia for longer than 1 year. Fibrosis becomes the dominant process and is irreversible. Mammograms typically show dendritic subareolar density with posterior linear projections radiating into the surrounding tissue toward the upper-outer quadrant. At sonography, there is a subareolar hypoechoic lesion with an anechoic star-shaped posterior border, which can be described as fingerlike projections insinuating into the surrounding echogenic fibrous breast tissue. A useful feature that suggests its benignity is that this star-shaped mass arises directly from the undersurface of the nipple without causing any overlying skin thickening or nipple retraction.
3) **Diffuse glandular gynecomastia** is commonly seen in patients receiving exogenous estrogen. At mammography, there is enlargement of the breast and diffuse density with both dendritic and nodular features. At sonography, both nodular and dendritic features are seen surrounded by diffuse hyperechoic fibrous breast tissue. The distinguishing feature from malignancy is the extensive disease without a discrete mass and absence of secondary signs.

Therefore, the mammographic and ultrasonographic appearance of gynecomastia is not similar to that of male breast cancer, but when gynecomastia is unilateral it can mask malignancy and pose a diagnostic problem.

**Lipomas** are characterized by a thin capsule that surrounds radiolucent lipomatous tissue. Characteristically, the capsule is seen in most of its circumference, unlike simple fatty lobules which are incompletely surrounded by the connective tissue of the breast. Calcification in lipomas occurs only rarely, possibly due to focal areas of fat necrosis. Clinically, these lesions are usually asymptomatic and slow growing and present as soft, well circumscribed lumps in the subcutaneous tissues. On ultrasound lipomas appear as well-circumscribed solid lesions with an even internal echo pattern. There is no associated significant distal acoustic shadowing or distortion of the surrounding breast tissue. Lipomas are seen separately from the normal breast disc, which appears as a well defined hypoechoic area located in a subareolar position.

**Epidermal inclusion cyst** is the third most common benign lesion in the male breast. Most often, these cysts arise from obstructed or occluded hair follicles, at the sites of previous skin trauma such as a surgical wound or insect bites.

Mammograms reveal a well-defined dense oval mass contiguous with the skin in the palpable area. An important sonographic feature is a hypoechoic lesion that is contiguous with the epidermis, the claw sign, with increased through transmission. This feature is the key to distinguishing this benign condition from cystic malignancies of the male breast.

**Fat necrosis** may be hard to differentiate from cancer, but usually there is a positive history of trauma. The mammographic appearances of fat necrosis can vary from those of a well circumscribed mass of homogeneous fat density to an irregular spiculated density that may be difficult to differentiate radiologically from a carcinoma. This may be particularly difficult if the usual secondary features of malignancy such as architectural distortion, or skin thickening and retraction are also present. Calcifications are also seen in fat necrosis. The ultrasound features of fat necrosis are variable and non-specific and may include signs of malignancy. The abnormalities described include those of a hypoechoic mass with associated surrounding architectural and skin distortion, making it radiologically indistinguishable from malignance. Thus, ultrasound examination, when used in isolation, is not reliable except in instances of regular follow-up of a lesion that is thought clinically to represent an area of fat necrosis.
**Male breast cancer** is a disease of older people, with a peak incidence around 60 years of age, 10 years later than its female counterpart. The majority of patients with breast cancer present with a painless, firm, subareolar but eccentric to the nipple lump with spiculated margins, frequently lobulated and accentuated by architectural distortion or a well-defined mass. Microcalcifications are uncommon. When present, they tend to be large, round and scattered, not grouped. At the intermediate stage, the lump may be painful to touch and may be accompanied by clinical gynecomastia and nipple retraction. Advanced disease is characterized by spontaneous pain or tenderness, a bloody nipple discharge, skin ulceration and Paget's disease. Its mean diameter varies, ranging from 2.0-3.5 cm. There may be fixation to skin or muscle and hilar adenopathy.

**On mammograms**, the presence of any solid mass should raise the suspicion of malignancy. Although a spiculated pattern is often seen, a malignant mass may also have smooth margins. An eccentric position is highly suggestive of a malignant process in the male breast. Secondary features of malignancy such as skin retraction or ulceration, and lymph node involvement are poor prognostic indicators.

Ultrasonographically, malignant lesions are typically hypoechoic with irregular margins. There may be poor definition of the margins of the lesion due to invasion of surrounding tissues with associated oedema and fibrosis. Sound transmission is variable and can range from dense distal acoustic shadowing to acoustic enhancement. Since the appearances of malignant lesions are so variable on ultrasound, recognition of secondary signs of malignancy such as skin retraction or ulceration, and disruption of the subcutaneous fat layer, which becomes more echogenic with loss of the normal fat-parenchymal interface)

**Differential diagnosis**

A history of consumption of medications known to be causing gynecomastia is not helpful in discriminating between gynecomastia and carcinoma of the breast in patients with unilateral breast masses, although it is helpful in patients with bilateral breast enlargement.

A family history of breast carcinoma is an important factor. The relative risk in the male relatives of women with breast carcinoma is more than twice the normal risk. This risk increases if the female relatives are young at diagnosis.

Alcohol consumption, but not smoking, has been linked to both carcinoma and gynecomastia. The effects of alcohol on the liver may alter the balance of sex steroids and result in a relative excess of estrogens. In addition, the yeast used in beer produces abundant estradiol, which has been linked to breast enlargement in chronic beer drinkers. Similarly, testicular pathology may alter the estrogen/androgen ratio and increase the risk
of gynecomastia. These observations provide some clues in the evaluation of older men with unilateral breast masses.

According to most authors, fine-needle aspiration cytology (FNAC) is an appropriate means of taking samples, but requires an experienced pathologist because the proliferative phase of gynecomastia is frequently confused with malignancy. Fine-needle aspiration cytology, when used, has a high rate of unsatisfactory specimens (15%). Few data exist on the use of needle core biopsy (NCB) for unilateral male breast lesions. Some suggest that a surgical or core biopsy of all suspicious lesions should be done. Needle core biopsy (NCB) is effective in distinguishing between benign, inflammatory and neoplastic swellings in the male breast. We suggest NCB should become a standard part of the assessment of unilateral male breast swelling, where there is diagnostic uncertainty.

**Diagnostic algorithm**

According to Vetto and colleagues, mammograms are of no benefit for patients younger than 50 years old. They reported a high rate of false-positive results due to gynecomastia and epidermal cysts. As for the histologic diagnosis, these authors found that FNAC has a tendency to overcall malignancy, due to epithelial hyperplasia.

In another study, Volpe and colleagues tried to document the actual differences in the diagnostic work-up between gynecomastia and breast cancer. They claimed that both mammography and FNAC have considerable value in differentiating gynecomastia from cancer but that mammography is not indicated for patients under the age of 50 years and in cases of central, painful, non-indurated masses.

On the other hand, Janes and colleagues stated in their study that needle core-biopsy (NCB) is a more effective initial investigation than FNAC, because it is helpful in distinguishing between benign, inflammatory and neoplastic swellings in the male breast, and it has the additional benefit of providing oestrogen receptor status in malignant cases.

We propose the following algorithm for the work-up of a unilateral breast mass in men under 50 years old (Table 1) and over 50 years old (Table 2).

**TABLE 1**

<table>
<thead>
<tr>
<th>AGE&gt;50 yrs</th>
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<tbody>
<tr>
<td>Presence of one or more risk factors</td>
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<tr>
<td>Mammography and US</td>
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</table>
Positive for cancer | Uncertain | Benign gynecomastia | Absent | Present
---|---|---|---|---
Surgery | FNA or NCB | Mammography and US | Observation in 4-6 months

*Risk factors include: positive family history, pain and bloody nipple discharge, hard fixed mass or skin ulceration and increased estrogen exposure*

**TABLE 2**

<table>
<thead>
<tr>
<th>AGE&lt;50 yrs</th>
<th>Increased estrogen exposure (exogenous or endogenous)</th>
<th>No estrogen exposure</th>
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<tbody>
<tr>
<td>Consider mammography and US due to increased risk</td>
<td>Patient on medications</td>
<td>No medication or illness</td>
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<tr>
<td></td>
<td>Reassess 6-12 months after cessation of medication</td>
<td>Reassure control in 12 months</td>
</tr>
</tbody>
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*Images for this section:*
Fig. 1: Unilateral nodular gynecomastia (bilateral CC mammogram)
Fig. 2: Unilateral diffuse glandular gynecomastia (bilateral MLO mammogram)
Fig. 3: Unilateral diffuse glandular gynecomastia (bilateral CC mammogram)

Fig. 4: Unilateral diffuse glandular gynecomastia. Transverse US image shows the diffusely heterogeneous breast with both nodular and dendritic projections surrounded by diffuse hyperechoic fibrous tissue.
**Fig. 5:** Bilateral diffuse glandular gynecomastia in the same patient 2 years after (bilateral MLO mammogram)
Fig. 6: Panniculitis (bilateral CC mammogram)
Fig. 7: Panniculitis (bilateral MLO mammogram)
Fig. 8: Breast lipoma (bilateral MLO mammogram)
Fig. 9: Breast lipoma. Transverse US image shows two parallel, homogeneous, mildly hyperechoic masses with a capsule under the skin.
Fig. 10: Oil cyst (left MLO mammogram)
Fig. 11: Oil cyst (tranverse US image)
Fig. 12: Invasive ductal carcinoma in a 63-old male (bilateral MLO mammogram)
Fig. 13: Invasive ductal carcinoma in a 63-old male (bilateral CC mammogram)
Fig. 14: Invasive ductal carcinoma in a 63-old male (right CC mammogram - magnification view)
Fig. 15: Invasive ductal carcinoma in a 63-old male (right MLO mammogram - magnification view)
Conclusion

In conclusion, carcinoma must always be excluded in male patients over 50 years presenting with unilateral breast masses. Suspicion should be increased if the masses are painless and nontender. Important clues are a history of malignancy and a family history of breast carcinoma. The clinician should not be misled by patients taking medications known to cause gynecomastia.

In the evaluation of unilateral male breast palpable lesions, mammography and ultrasonography are essential and should be performed along with physical examination. If any doubt remains, a biopsy (FNAC or NCB) should be performed.

Personal Information

References


