

Mammography Findings of Male Breast Diseases

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ABSTRACT

Over the past 2 decades, the percentage of men presenting with breast complaints has increased from 0.8% to 2.4%, and men now account for 1% of all breast cancer cases. The most common male breast mass is gynecomastia, followed by lipoma and epidermal inclusion cysts. Because there is a paucity of parenchyma as compared with the female breast, the malignancy rapidly progresses to the next stage, with the appearance of secondary signs like nipple retraction, fixation to deeper tissues, skin ulceration or adenopathy. Diagnostic evaluation is needed only when the palpable mass is unilateral, hard, fixed, peripheral to the nipple, or associated with nipple discharge, skin changes, or lymphadenopathy. Male breast cancer usually occurs in a subareolar location or is positioned eccentric to the nipple; occasionally, it occurs in a peripheral position. Secondary signs like skin thickening, nipple retraction, and axillary lymphadenopathy may be seen. Microcalcifications can occur. Mammography can accurately distinguish between malignant and benign male breast disease. Radiologists are generally less familiar with breast disease in males compared with females. In this article, we discuss the clinical, and mammographic features of a variety of benign and malignant diseases that can occur in the male breast.

Keywords: Breast, male, mammography

Introduction

The rate of men with breast complaints increased from 0.8% to 2.4% over the last two decades, and at present male breast cancer constitutes 1% of all patients with breast cancer (1). Nevertheless, 94.63% of male breast lesions are benign, 82.8% of which are gynecomastia (2). Breast imaging is rarely used in men with symmetric breast enlargement or symmetric subareolar thickening, since the diagnosis is usually made by physical examination. However, if the patient and/or the doctor find an asymmetric thickening of the breast or a breast lump then breast imaging is required for further evaluation (3). The diagnosis is established by bilateral mammography and ultrasonography (USG) in a male patient with a palpable breast lump (4). USG is not a very helpful imaging technique for the evaluation of male breast diseases, except differentiation of cystic/solid mass lesions and/or ultrasound guided biopsy. Once the diagnosis of gynecomastia is confirmed by mammography an ultrasound examination is not usually required. Before recognition of this data in the literature, physicians used to obtain an ultrasound in some men (3). Unlike female breast imaging, there are no standardized protocols for male breast imaging (2). In male patients, routine mammographic examination usually includes compressed mediolateral oblique and craniocaudal images (5). Sometimes advanced imaging methods such as obtaining magnified images with focal compression may be required (6). Well-developed pectoral muscles in men may mask the breast tissue. In these patients, breast tissue can be better viewed by pushing the pectoral muscle. These images can be obtained by pushing the pectoral muscle posteriorly and asking the patient to contract these muscles as the technician pushes the breast tissue closer to the detector (2). The normal male mammography displays ductal structures that extend from the areola to the posterior and lucent fat tissue that contain connective tissue (7).

Radiologists are less familiar with diseases of the male breast as compared to female breast diseases (8). This article reviews the various benign and malignant breast diseases in men in terms of their mammography and clinical findings.

Anatomy

The male breast extends from the anterior section of the second and sixth ribs, as the female breast. The sternum forms the medial border and the mid-axillary line (9) forms the lateral boundary. The mammary gland is located between the pectoral muscle and subcutaneous tissue (10). Male and female breasts are the same at birth. Subareolar ducts in the normal male breast are histologically similar to ducts in pre-pubertal girls. Most men do not develop any of these structures (3). The breast of a healthy adult male is mainly composed of

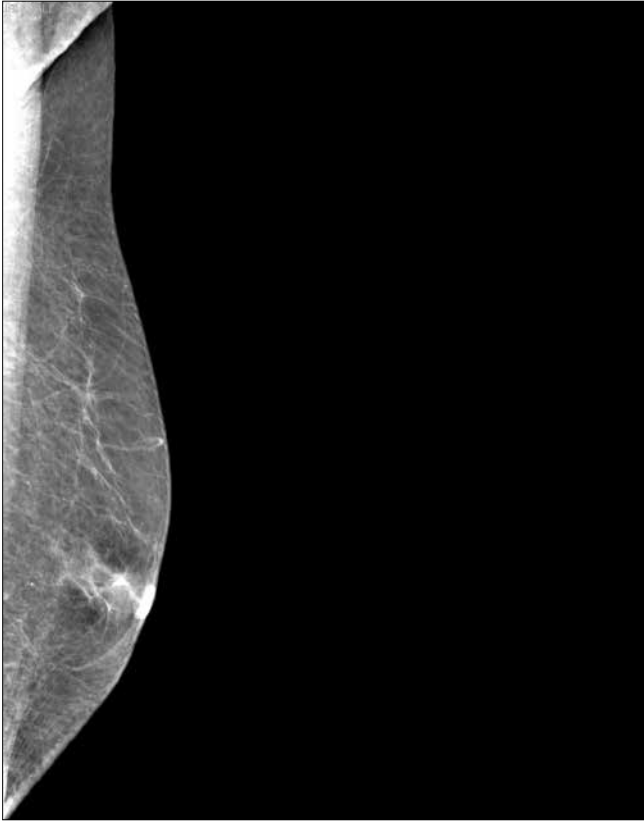


Figure 1. 72-year-old male patient. Normal left breast MLO image

fat tissue that contains several ducts and stroma. It is separated from the female breast that mainly consists of ducts, stromal and glandular tissue with these properties (9). The development of lobular breast is stimulated by estrogen and progesterone. Therefore, lobular proliferation related breast diseases such as fibroadenoma, phyllodes tumor, invasive lobular carcinoma and lobular carcinoma in situ are very rare in men. However, ductal and stromal proliferation-related diseases such as gynecomastia, invasive ductal carcinoma and papillary neoplasm are more common in men than diseases related to lobular proliferation (Figure 1) (11).

Gynecomastia

Gynecomastia is the most common cause of male breast enlargement (6). Gynecomastia is a disk-like tissue, beneath the nipple, at least 0.5 cm in diameter, which presents as a unilateral or bilateral palpable mass (12). There is usually palpable swelling, focal tenderness and burning sensation in men with gynecomastia (2). Although the adult male breast normally contains a minimal amount of adipose tissue and glandular tissue, proliferation may occur if estrogen and progesterone levels are increased. Gynecomastia can be physiologic or non-physiologic. Physiological gynecomastia is related to an imbalance in estrogen-testosterone ratio, and consequent glandular breast tissue proliferation (13). Physiological gynecomastia formation generally displays three peaks: The first peak is in the neonatal period (transient gynecomastia occurs in 60-90% of infants due to transplacental maternal estrogen exposure), the second peak is seen in adolescents in puberty, and the third peak occurs late in life (50 - 80 year old males) (14). The non-physiologic gynecomastia can occur in any age group due to serious health problems such as endocrine and hormonal disorders, Klinefelter's syndrome, systemic diseases, neoplasms, medications, and obesity (15). Especially patients with palpable, unilateral,

hard, fixed lesions at the periphery of the areola, associated with nipple discharge, skin changes or lymphadenopathy should undergo further diagnostic evaluation (6).

There are three types of gynecomastia: nodular, dendritic and diffuse glandular. These types vary according to the degree of ductal and stromal proliferation (16). Dendritic gynecomastia is seen as retroareolar soft tissue density with marked radial extension into deep fat tissue. The dendritic type is in correlation with the pathological classification of fibrous gynecomastia. This indicates that the gynecomastia has been present for a long time (17). Histology of fibrous gynecomastia is characterized by ductal proliferation surrounded by fibrous stroma (18). Nodular gynecomastia is seen as a funnel shaped intensity radiating from the nipple; it may be symmetrical or prominent in the outer quadrant. The density is usually fused into the surrounding fatty tissue, but may also be more spherical. The mammographic image of diffuse glandular gynecomastia is similar to heterogeneous dense image of the female breast (16). Dendritic and nodular features can also be seen within the breast besides the diffuse increase in density and enlargement (Figure 2) (18).

Pseudo-gynecomastia

Enlargement of male breast due to actual loss of breast tissue and deposition of excessive fat tissue instead is called pseudo-gynecomastia. It usually occurs in older men and overweight young men (18). The diagnosis is based on clinical findings (19). The enlarged breast tissue contains radiolucent fat, and is easily differentiated from true gynecomastia by this feature (16).

Lipoma

Lipomas are the most common type of soft tissue tumor, with a prevalence of 2.1 per 1,000 (20), and are the second most frequent benign breast lesion in males (21). Lipoma is a well-defined, encapsulated mass that contains adipose tissue. Usually they present as small, palpable, soft or firm (if it is calcified) asymptomatic masses (10). Lipomas may be numerous and/or show bilateral distribution (2). The well-defined, radiolucent image (11) and presence of a radio-opaque capsule (2) on mammography is extremely useful in diagnosis.

Fat necrosis

Fat necrosis develops secondary to a blunt or penetrating trauma, and presents as a tender mass that may be associated with dystrophic calcification. It may be seen as large calcifications with a radiolucent center or a radiolucent well-defined lesion on mammography (2). However, the mammographic image of a lipoma may be mistaken for breast cancer or breast abscess (22).

Inflammatory Diseases of the Breast

Mastitis refers to breast infection that is relatively less common in men as compared to women (10) and that can develop into an abscess (23). Microorganisms enter via the nipple and progress into the gland following trauma (e.g. nipple piercing). Typical symptoms of mastitis are local inflammation, pain, erythema, fever, skin thickening and edema (10). Mastitis is generally seen as unilateral breast growth accompanied by skin thickening on mammography (23).

Subareolar abscesses are the most common inflammatory lesions of the male breast. They are usually related to chronic mastitis (24). Subareolar abscesses are chronic lesions associated with ductal ectasia. They have a tendency to recur even after treatment with excision of the abscess and duct (23). General clinical signs include fever, swelling of the nipple and nipple discharge. The most common microorgan-



Figure 2. Mammography of a 66-year-old male patient with a palpable mass on breast examination. Left MLO view revealed retroareolar, regular contoured lesion with soft tissue density in the left breast. Gynecomastia

isms leading to abscess are *Staphylococcus aureus* and *Staphylococcus epidermidis* (25). Retroareolar abscesses can be seen as masses with or without calcification on mammography. In the presence of an abscess, there is skin thickening. Differentiation from malignancy is difficult by mammography (18, 23).

Intramammary lymph node

Intramammary lymph nodes can be detected anywhere in the breast, mostly in the upper outer quadrant. Normal lymph nodes can be seen as oval or reniform structures with dense peripheral edge corresponding to the cortex and more radiolucent center corresponding to hilar fat tissue on mammography (22).

Epidermal inclusion cyst

Gynecomastia is the most common mass in the male breast followed by lipomas and epidermal inclusion cysts (26). Dermal lesions such as epidermal inclusion cysts may develop in men like in women (2). These lesions arise from obstructed hair follicles (18), and classically present as a palpable mass that may or may not be accompanied by tenderness. Epidermal inclusion cysts are typically seen as relatively small, well-defined, superficial lesions on mammography (2). If the cysts rupture, the cyst contents initiate an inflammatory reaction. It is difficult to distinguish ruptured cysts from malignant lesions on mammography because of their irregular boundaries (27).

Diabetic Mastopathy

Diabetic mastopathy is a rare fibroinflammatory breast disease in men. Characteristically, it is seen in patients with long-standing type 1 diabetes (28). Diabetic mastopathy is not among risk factors for breast cancer (29). Differentiation from malignancy is often difficult only

with physical examination findings. The size of the lesion shows considerable variation between 5 mm and 6 cm (30). For that reason, imaging findings generally increase the level of clinical suspicion of breast cancer (31). Diabetic mastopathy mimics breast cancer and a biopsy is usually required for definitive diagnosis. It can be seen as a nonspecific mass or local asymmetry on mammography (28).

Malignant Diseases of the Breast

Male breast cancer is rare. 0.8% of all breast cancers occur in men; it constitutes less than 1% of all newly diagnosed cancer in men and is responsible for 0.2% of cancer-related deaths (32). The average age on diagnosis of male breast cancer is 67, which is 5-10 years more than the average age of women on diagnosis (33). Male patients with Klinefelter's syndrome, a history of orchitis or testicular tumor, liver disease, thoracic radiotherapy, and genetic predisposition (BRCA 2 gene mutation, presence of breast cancer in female relatives, p53 mutation) are at risk for developing breast cancer (34). In men, the most common clinical sign of breast cancer is a painless, palpable retro-areolar mass (35). As compared to the female breast, breast malignancy rapidly progresses to advanced stages in the male since the parenchyma is inadequate, showing secondary symptoms such as nipple retraction, fixation to deep tissues, skin ulceration and lymphadenopathy (18). The most common forms are invasive ductal carcinoma (85% of cases), papillary carcinoma and lymphoma (36). Breast cancer usually occurs in a subareolar location or a site that causes alteration of the nipple, and they are rarely located peripherally (37). Secondary signs such as skin thickening, nipple retraction, axillary lymphadenopathy (18) and microcalcifications may be observed on mammography (3). Mammography often plays an important role in the differentiation of benign and malignant breast diseases in men. Although not an alternative to physical examination, the routine use of mammography in patients with physical examination findings suggesting benign diseases can substantially reduce the requirement for biopsy (38). Nevertheless, mammography cannot absolutely exclude malignancy in male patients, as is the case in women. It also should be kept in mind that mammography may lead to a false negative result in the concomitant presence of dense gynecomastia and malignancy (Figure 3, 4) (3).

Conclusion

Breast cancer is very rare in men as compared to women. However, the rate of men with breast complaints increased from 0.8% to 2.4% over the last two decades (1). Thus, the requirement for breast imaging in males is increasing. Especially patients with palpable, unilateral, firm, fixed lesions at the periphery of the areola, associated with nipple discharge, skin changes or lymphadenopathy should undergo further diagnostic evaluation (6). Although mammography has a significant role in the differentiation of benign breast diseases from malignant ones (38), radiologists are less familiar with male breast diseases as compared with those in females (8). With this review, we aimed to overview various benign and malignant breast diseases in men in terms of their mammography and clinical findings, and increase awareness.

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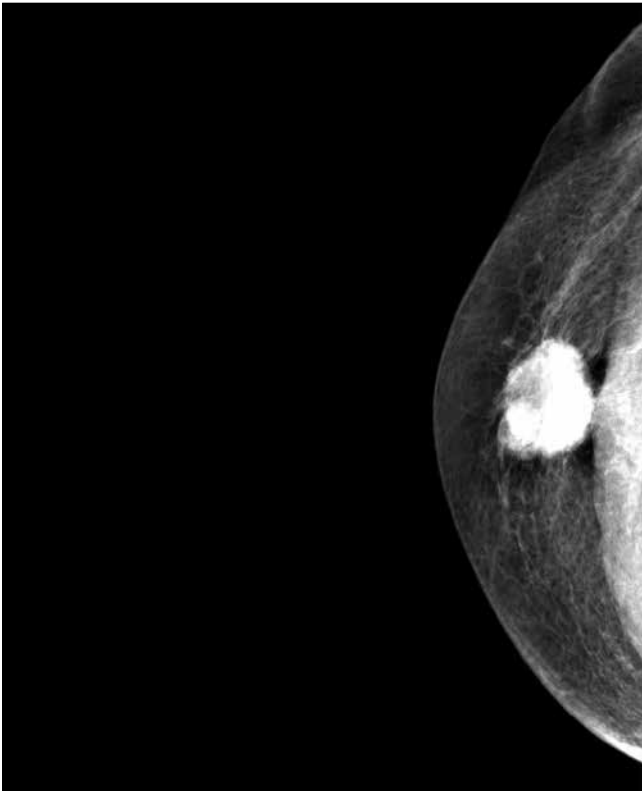


Figure 3. Mammography of a 72-year-old male patient with a palpable mass in the breast. CC view showing a lobulated mass in the right breast. Invasive ductal carcinoma

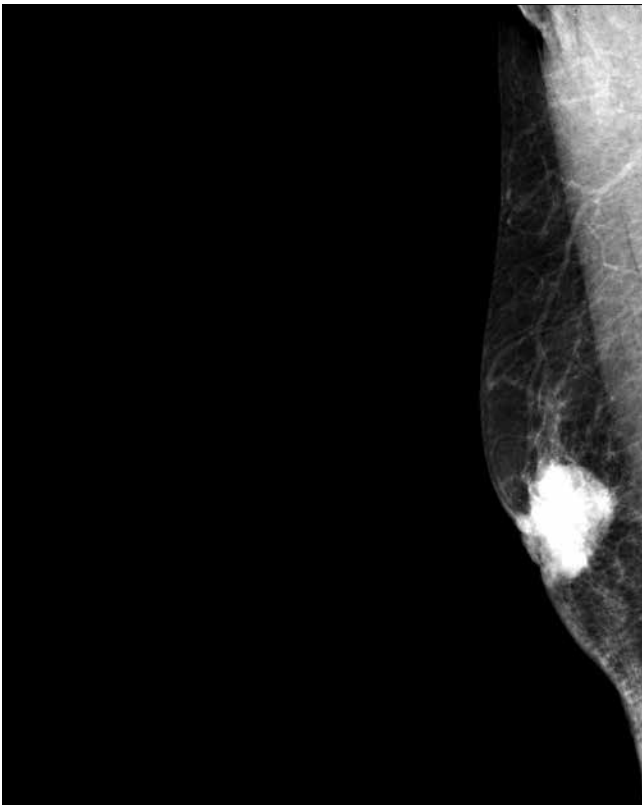


Figure 4. Mammography of a 72-year-old male patient with a palpable mass in the breast. CC view with an irregular lobulated mass in the right breast. Skin thickening and nipple retraction in invasive ductal carcinoma

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