Unusual male breast lesions. Radiological findings.

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Learning objectives

To illustrate the mammographic and ultrasonographic findings of unusual male breast lesions.

To highlight the radiological findings that may help distinguish between benign and malign lesions.

To know and identify the radiological features of these lesions to properly manage these patients.
Background

Although gynaecomastia is the most common disease of the male breast (80%), it may be affected by many others.

Breast carcinoma accounts for <1% of all breast cancer and <1% of all cancer cases in men. However, carcinoma is the second breast disease in men (3%).

The vast majority of other conditions arise from skin or subcutaneous tissues, such as lipoma and epidermal inclusion cyst.

Less than 1% of breast imaging examinations are performed in men. Thus, imaging characteristics of unusual male breast lesions are not very familiar to radiologists.
Findings and procedure details

Mammographic and ultrasonographic findings of various unusual male breast lesions are illustrated.

We review the clinical and imaging features of the male breast lesions diagnosed at our hospital in the last twenty years, excluding gynaecomastia. The final diagnosis was made based on clinical-radiological follow-up or histopathological results.

We include: lipoma, epidermal inclusion cyst, inflammation and abscess, tubular adenoma, fibromatosis, fat necrosis, hamartoma, hemangioma and breast cancer (ductal infiltrating carcinoma, infiltrating papillary carcinoma and intraductal carcinoma).

LIPOMA:

This is the second most frequent cause of benign lesions of the breast in men. They present as soft, mobile and well-circumscribed masses. At mammography, lipomas can be difficult to detect in breasts with a large fat component. They present a fine capsule that surrounds the radiolucent fatty tissue.

At ultrasound, lipomas are solid hyperechogenic and homogeneous lesions, with well-defined margins, without posterior sound attenuation (Fig 1 and 2).

Radiological findings characteristic of lipoma are classified as BI-RADS® category 2.

EPIDERMAL INCLUSION CYST:

Epidermal inclusion cyst is a skin lesion. This is the third most frequent cause of benign lesions in the male breast. It presents as a soft, rounded mass, fixed to the skin but mobile in relation to the underlying tissue.

At mammography, it presents as a round well circumscribed dense mass located peripherally in relation to the skin.

At ultrasound, this lesion presents as a well-defined and hypoechogenic mass, with good sound transmission. The lesion can have heterogenous echogenicity and present the appearance of a complex or solid lesion. The extension of the mass into the dermis is an important finding that is visualised in 86% of cases and suggests a cutaneous origin (Fig 3, 4 and 5).

Radiological findings which are characteristic of epidermal inclusion cyst are classified as BI-RADS® category 2.
INFLAMMATION AND ABSCESS:

Pain, swelling, reddening of the breast and fever are the presenting symptoms. A residual mass can persist, making it difficult to rule out carcinoma.

Mammography shows a focal thickening of the skin with increased retroareolar density. The abscesses appear as masses with ill-defined margins and punctate calcifications. They can also manifest without a clearly defined mass, as a density that irradiates out from the nipple, mimicking gynecomastia. In these cases, thickening of the skin is suggestive of an abscess (Fig 6). Ultrasound may show a complex predominantly cystic mass, with good sound transmission.

OTHER UNUSUAL BENIGN LESIONS

Fibroadenoma and phyllodes tumour are very rare in men because lobular development is rare in men. Tubular adenoma most often affects young women or women in reproductive age. They are very uncommon in men (Fig 7).

Fibromatosis usually manifests as a very firm, non-tender mass. It is sometimes fixed to the pectoral fascia and skin retraction may also be present, mimicking breast cancer. The lesion tends to recur locally if it is not widely excised. Fibromatosis simulates malignancy in mammography imaging, as an irregularly shaped, uncalcified, high-density spiculated mass and at US, as an irregular, hypoechoic mass with posterior acoustic shadowing. Fibromatosis is extremely uncommon in the male breast (Fig 8).

Fat necrosis can vary from a lucent nodule to an irregular spiculated soft-tissue density mass. Calcification can occur (Fig 9).

At mammography, hamartomas are typically well-circumscribed, round to oval masses containing both fat and soft-tissue density with a thin, radiopaque pseudocapsule that becomes visible around a portion of the mass when fat is present on both sides. At US, they manifest as a sharply defined, heterogeneous oval mass or as normal glandular tissue (Fig 10).

Hemangioma is a very rare male breast tumour. So there are few cases described in the literature. A biopsy is required and the differential diagnosis with angiosarcoma is important (Fig 11).

BREAST CANCER:
It accounts for <1% of all breast cancer and <1% of all cancer cases in men. Nevertheless, it is the second most frequent breast pathology in men after gynaecomastia. Approximately 85% of carcinomas are ductal infiltrating carcinomas and only 7% are intraductal.

It presents as a painless, hard and immobile unilateral mass located in the subareolar region, eccentric to the nipple. Other signs may be present as skin and nipple retraction, nipple discharge and axillary lymphadenopathy.

At mammography, breast cancer usually presents as a mass (85% of cases), usually located in the subareolar region, eccentric to the nipple. The margins are usually ill-defined or spiculated, although it can be circumscribed in 15% of cases. Associated findings such as thickening of the skin, retraction of the nipple and axillary adenopathies may be present. Calcifications are found in 30% of cases and they are coarser than in women.

The ultrasonographic findings are similar to those for breast cancer in women. This generally appears as a hypoechogenic and heterogeneous mass. The borders of the lesion are usually ill-defined. However, they can also have well-defined margins. Acoustic transmission is variable.

The most frequent form of presentation of breast cancer in mammography and ultrasound is as a lesion of BI-RADS® category 4 or 5 (Fig 12-22). However, 15% of cases can present as a mass of BI-RADS® category 3 (Fig 23).
**Fig. 1:** Lipoma. 28 year old male patient who complains of breast lump. The ultrasound is classified as BI-RADS® category 2 as it appears as a hyperechoic and homogeneous solid lesion, with well-defined margins. No further posterior sound attenuation or distortion of adjacent breast tissue is appreciated.

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Fig. 2: Lipoma. 55 year old male with soft nodule in the inferointernal quadrant of the left breast. Mammography of the left breast shows pseudogynaecomastia. An ultrasound shows a well-circumscribed echogenic nodule. BI-RADS® category 2. It is common for lipomas not be visible on the mammogram since they may be masked by surrounding lucent fat.

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Fig. 3: Epidermal inclusion cyst. 30 year old man who complains of a hard, mobile, yet painless nodule in the left breast that has developed over the last year. Mammography and ultrasound show a nodule which is well-circumscribed in relation with the skin. BI-RADS® category 2.

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Fig. 4: Epidermal inclusion cyst. 30 year old man who complains of lump in his left breast. Mammography and ultrasound show a nodule which is well-circumscribed in relation with the skin. BI-RADS® category 2.

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**Fig. 5:** Epidermal inclusion cyst: The right mammograms of this 54 year old male patient show a well-circumscribed nodule.
Fig. 6: Breast abscess. The left mammograms (A) show a large poorly defined mass (BI-RADS® category 4). The control mammography after antibiotic treatment (B) shows gynaecomastia and resolution of the inflammatory process.

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Fig. 7: The mammography of this patient (images A and B) shows a significant bilateral gynaecomastia and a circumscribed nodule in the left breast. On ultrasound (image C) the nodule is solid and well-defined. We performed a core needle biopsy under ultrasound guidance (image D) resulting in tubular adenoma.

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Fig. 8: Recurrence of fibromatosis. This is a 36 year old male with a history of desmoid tumor removal in the right breast three years ago. He sought consultation due to two nodes. Physical examination showed two hard masses adhered to deep planes in the upper outer quadrant of the right breast. The mammogram showed two spiculated nodules and gynecomastia. On the ultrasound, the nodules had irregular borders with acoustic shadowing. BI-RADS category 5. The lesions were biopsied with ultrasound-guided needle biopsy. The CT scan was performed to plan a more aggressive surgery.

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Fig. 9: Fat necrosis. 37 year old patient that seeks consultation for a painless lump in the right breast that appeared one year ago. The patient underwent surgery. The pathology results showed fat necrosis and gynaecomastia.

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Fig. 10: Hamartoma. 21 year old male with right breast mass. The mammography shows a well-circumscribed mass with areas of fat in it. On ultrasound the lesion is oval, well defined and echogenic. BI-RADS® category 2.

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Fig. 11: Forty-four year old male patient consulting for a nodule in the left breast. The mammography shows a left gynaecomastia and a nodule with ill-defined contours in inferointernal quadrant of the right breast. The nodule is solid and discreetly echogenic on ultrasound. Core needle biopsy was performed and the results were vascular papillary tumor suggestive of angiosarcoma, and recommendation of a surgical biopsy. In the diagnostic work-up CT scan the nodule can be observed in the right breast. A lumpectomy was performed after placement of a harpoon with a pathology report of hemangioma.

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Fig. 12: Infiltrating ductal carcinoma. The mammograms of the right breast in this patient showed a spiculated nodule classified as BI-RADS® category 5. Diagnosis: histologically proven infiltrating ductal carcinoma.

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**Fig. 13**: Infiltrating ductal carcinoma. The left CC and MLO mammogram shows a partially well-circumscribed mass with calcifications (BI-RADS® category 4). Ultrasound-guided biopsy of the mass. The tip of the needle is visible.

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**Fig. 14:** Bilateral carcinoma. The mammography of this man shows bilateral retroareolar nodules, the right one causes nipple retraction (images A and B). They are solid nodules by ultrasound (image C). They were classified as BI-RADS® category 4 and we performed a core needle biopsy guided by ultrasound (image D), resulting in invasive ductal carcinoma in both nodes.

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Fig. 15: Infiltrating ductal carcinoma. 67 year old man who complains of a right axillary node. The node was biopsied and the histology was of metastatic carcinoma, of probable breast origin. The mammography shows a right retroareolar partially well-defined nodule with a small lobulation. There was nipple retraction and multiple enlarged axillary lymph nodes. BI-RADS® category 4. The CT shows the 1 cm nodule of the right breast and axillary lymphadenopathies. Postsurgical changes after axillary biopsy.

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Fig. 16: A 62 year old man consults about lump in his left breast. The mammograms of the left breast show a subareolar nodule with retraction of the nipple and the pectoral muscle. BI-RADS category 4. We performed core needle biopsy guided by ultrasound resulting in infiltrating ductal carcinoma.

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Fig. 17: A 67-year-old man presenting with bloody nipple discharge. Mediolateral oblique mammogram of the right breast shows gynaecomastia and calcifications classified as BI-RADS category 4. A ductal carcinoma in situ was found.

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**Fig. 18:** Patient with a history of prior lumpectomy and left mamilectomy due to a carcinoma. Under physical examination, a suspicious nodule was palpated on the right. In the bilateral mammogram a right partially well-circumscribed nodule (BI-RADS category 4) and an asymptomatic recurrence in the left breast (spiculated nodule, category 5) were appreciated. Diagnosis: bilateral metachronous carcinoma and recurrence.

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**Fig. 19:** 71 years old male patient who presents with a left breast nodule. Mammography and ultrasound show a partially well-defined subareolar nodule (BI-RADS category 4). The nodule was biopsied under ultrasound guidance. The final diagnosis was infiltrating papillary carcinoma.

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Fig. 20: The ultrasonography of the left breast of this 46 year old man shows a subareolar nodule classified as BI-RADS category 4. Diagnosis: Infiltrating ductal carcinoma.

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Fig. 21: Sixty-seven year old male patient with a hard and adhered left retroareolar nodule. The mammogram shows a lobulated nodule. Ultrasound shows the nodule and multiple suspicious axillary lymphadenopathies. A biopsy of the nodule and an ultrasound-guided lymph node biopsy were performed. The CT scan made as part of the diagnostic work-up shows the breast lump and the axillary lymphadenopathy. Diagnosis: Infiltrating ductal carcinoma.

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**Fig. 22:** Ninety-one year old patient consulting for a nodule in the right breast. Physical examination demonstrates a poorly defined hard nodule adhered to deep planes. The mammogram shows an ill-defined mass. The ultrasound shows a suspicious mass and axillary lymphadenopathy. Diagnosis: Infiltrating ductal carcinoma.

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Fig. 23: Infiltrating ductal carcinoma. The mammography (A, B) shows a circumscribed subareolar nodule eccentric to the nipple. There is nipple retraction. On ultrasound (C) the nodule is solid and has well-defined borders. It was classified as BI-RADS® category 3. Circumscribed solid nodules classified as BI-RADS® category 3, unlike in women, should be biopsied in men, given the high positive predictive value for this category described in these patients.

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Conclusion

There is a wide spectrum of unusual male breast lesions. Although some benign lesions such as lipoma, epidermal inclusion cyst and hamartoma have specific radiological characteristics, most of them resemble breast cancer with a substantial overlap in the imaging features. Therefore histological examination is essential for diagnosis.
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