Purpose

**Introduction:**

The most common reasons for male breast evaluation include: palpable lumps, breast enlargement (gynecomastia) and pain or tenderness.

Most of the evaluated lesions reveal benign tumors.

Gynecomastia and breast cancer are the two most important diseases of the male breast.

Fortunately, breast cancer in men is an uncommon entity, accounting for 0.8% of all cases of breast cancer and 0.17% of all cancer in men.

On the other hand, gynecomastia is a common disease, especially in adolescents and men older than age 50 years.

**Purpose/aim:**

1. To describe the imaging findings of patients with clinical gynecomastia

2. To establish its radiologic-pathologic correlation

**Methods and Materials**

Retrospective review of 54 patients evaluated at our institution from April 2007 to September 2009.

The patients with clinical gynecomastia presented with: palpable lumps and breast enlargement, with or without associated pain.

All of them underwent mammography (MG) and/or sonography (US).

Criteria applied for the Radiologic Study:

- MG and US: were performed to all patients ≥35 year old

- US: was performed to all patients <35 year old (to avoid radiation)
All the patients underwent 14G needle biopsy sonographically guided.

The imaging findings were correlated with the pathological results.

The imaging findings that were evaluated included:

- Mammographic features: nodule only, nodule and calcifications, calcifications only, fan-shaped density, architectural distortion, and no significant mammographic alterations.

- US features: nodule, hypoechoic area, and mixed echogenicity area (hypoechoic and hyperechoic)

Regardless of the imaging method, other features were evaluated: lesion location (central or eccentric), and presence of associated findings (such as nipple retraction, nipple discharge, skin retraction, skin thickening, enlarged axillary lymph nodes).

Results

Of the 54 patients studied, 42 underwent MG + US and 12 underwent US. 58 needle biopsies were performed (both breast were biopsied in 4 patients).

Patients´ age range : 14-82 years (mean, 52.4).

From the 44 reviewed mammograms, the mammographic findings were as follows (Fig. 1):

5 patients (11%) had a nodule
1 patient (2%) had a nodule with calcifications
32 patients (73%) had a retroareolar fan-shaped density
6 patients (14%) didn't have significant mammographic alterations.

No patient presented with calcifications only or with architectural distortion.

From the 58 sonograms that were performed, the sonographic features were as follows (Fig. 2):

15 patients (26%) had a nodule
31 patients (53%) had a retroareolar hypoechoic area

12 patients (21%) had a retroareolar mixed echogenicity area (hyper and hypoechoic)

Only 2 patients presented associated alterations: one of them presented nipple retraction and the other one skin thickening.

Final pathological results were as follows (Fig. 3):

3 (5%) infiltrating carcinoma

26 (44%) gynecomastia

10 fibroadipose tissue

5 fibrous tissue

5 adipose tissue

3 epithelial hyperplasia

1 lipoma

1 intracystic papilloma

1 inflammatory changes with fat necrosis

3 insufficient tissue

**Malignant pathology:**

Only 3 patients (5%) had breast cancer, all of them being 60 years old or older.

At mammography, all of them appeared as high-density nodules with ill-defined or microlobulated margins (Fig. 4). One of them had associated microcalcifications (Fig. 5).

The location was retroareolar in all the cases; 2 of them were eccentric and 1 was central (Fig. 6)
At sonography, the 3 of them appeared as hypoechoic solid nodules, 2 of them rounded with ill-defined margins and another with an irregular morphology with well-defined margins. (Fig. 4-6).

Both patients that presented associated alterations were among the 3 breast cancers: one of them had nipple retraction, the other one had skin thickening. All of them had being classified as BI-RADS 4 or 5 categories.

All the 3 breast cancers were infiltrating ductal carcinomas. Only the case that showed skin thickening was associated with Paget's disease in the pathological analysis.

**Benign Pathology :**

The most common disease was gynecomastia, accounting for up to 44% of the biopsied lesions.

Typically, the mammographic evaluation (92% of the cases) revealed a retroareolar fan-shaped density with posterior linear projections radiating into the surrounding tissue (Fig. 8 A) (Fig. 7). Sometimes its appearance was similar to the heterogeneously dense breast of the woman (Fig. 9).

At sonography, most of gynecomastias appeared as a triangular hypoechoic area, ill-defined, in up to 65% of cases (Fig. 8B) (Fig.7 y Fig. 10).

Another frequent sonographic finding in gynecomastia was a heterogeneous area, hyper and hypoechoic, appearing in up to 31% of cases (Fig.11).

Only one patient with histologically proved gynecomastia presented as a nodular density at mammography and at sonography (Fig. 12). In some rare cases, the mammographic pattern of gynecomastia can mimic a malignant lesion.

The other benign conditions had a mammographic and sonographic pattern similar to that of gynecomastia (Fig. 13-15), except for the epithelial hyperplasia, the fibroadipose tissue, the adipose tissue and the unique lipoma.

Among the benign entities, in 11 cases, the sonographic findings showed solid nodules without mammographic evidence:
5 cases of fibroadipose tissue

2 cases of epithelial hyperplasia (Fig. 16)

3 cases of adipose tissue (Fig. 17)

The lipoma exhibited the common sonographic pattern seen in this lesion, appearing as an hyperechoic well-defined nodule (Fig. 18).

Among the 11 nodular lesions: all of them showed a rounded or ovoid morphology, with well-defined margins. 6 of them were eccentric, 4 had a peripheral location in the breast and 2 were retroareolar.

These findings demonstrate, once again, some overlap between the sonographic appearance of benign and malignant nodules.

Images for this section:
Fig. 1: Fig. 1

Fig. 2: Fig. 2
Fig. 3: Fig. 3. Pathological Results
Fig. 4: Indurated retroareolar nodule in the left breast. MG: High-density microlobulated nodule with associated skin thickening. US: Solid hypoechoic, ill-defined nodule, eccentrically located in relation to the nipple. Path: Infiltrating ductal carcinoma with Paget’s disease.
Fig. 5: Firm and irregular nodule medial to the nipple in the left breast. MG: High-density nodule with microlobulated margins and microcalcifications. US: Hypoechoic irregular solid nodule with well-defined margins. Path: Infiltrating ductal carcinoma.
Fig. 6. Right breast showing a retroareolar indurated area with nipple retraction. MG: High-density ill-defined nodule. US: Hypoechoic solid ill-defined nodule centrally located in the retroareolar region. Path: Infiltrating ductal carcinoma.
Fig. 7: MG: Left breast with retroareolar dendritic increased density. US: Irregular and ill-defined hypoechoic area. Path: Ductal proliferation with epithelial and stromal hyperplasia associated with gynecomastia.
Fig. 8: Fig. 8 (A and B).
Fig. 9: Mammographic appearance of diffuse bilateral gynecomastia.
Fig. 10. Left breast gynecomastia. A- Ill-defined hypoechoic retroareolar area. B- US-guided biopsy.
Fig. 11: Left breast showing a retroareolar area with mixed echogenicity, pathologically corresponding to gynecomastia
Fig. 12: Fig. 12. A- MG: Nodular density centrally located in the right breast. B-US: Heterogeneous firm nodule, measuring 3,1 x 1,1cm, C-US-guided core biopsy.
Fig. 13: Fig. 13. Retroareolar hypoechoic triangular area in the left breast. Path-Intracystic papilloma.
**Fig. 14:** Fig. 14. Retroareolar hypoechoic triangular area in the right breast. Path- Chronic inflammation with fat necrosis.
Fig. 15: Reparative fibrous tissue. A-MG: Retroareolar fan-shaped density in the left breast. B-US: Retroareolar hypoechoic area, centrally located. C-US-guided core biopsy.
Fig. 16: Fig. 16. Retroareolar well-defined hypoechoic solid nodule, measuring 0.3 cm. Path- Ductal epithelial hyperplasia.
Fig. 17: Well-defined isoechoic solid mass, measuring 8.7 x 2.7 cm, in the upper internal quadrant of the left breast. Path- Adipose tissue.
Fig. 18: Fig. 18. Palpable, well-defined, hyperechoic solid nodule, measuring 1.4cm, upper external in the right breast. Path- Lipoma
Conclusion

• Primary male breast cancer is typically retroareolar and eccentric. The margins of the lesion may be well or ill-defined. Calcifications, without associated mass, are less common than in female breast cancer. Associated features (including skin, nipple and axillary lymph nodes) are frequent, although they are not a constant finding.

• The most common histological type of breast cancer encountered in our series is infiltrating ductal carcinoma, accounting for approximately 85% of cases, consistent with previous reports in the literature.

• Gynecomastia was the most common condition affecting the male breast. The MG generally appears as a fan-shaped density radiating from the nipple. At US it appears as a retroareolar triangular hypoechoic area. These radiologic patterns are the most frequently encountered in our series. However, in rare cases, the mammographic appearance may simulate malignancy.

• The majority of other benign lesions of the breast (besides gynecomastia) shows a radiologic pattern similar to the gynecomastia pattern; although some entities may appear as nodular lesions, some of them with an eccentric location. And, even if a peripheral location in the breast can be an useful finding for suggesting benignity, it is not a definitive criterion.

• Although some mammographic and sonographic features allow the distinction between breast cancer and bening lesions, in some cases it is still difficult due to some overlap of the radiologic findings. It is important to keep in mind the possibility of breast cancer in the cases of unilateral gynecomastia and to obtain the pathologic diagnosis in all the nodular lesions discovered in the male breast.

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