

Clinical, imaging and histopathological characteristics of benign breast disorders in men

Características clínicas, imagenológicas e histopatológicas de desórdenes benignos de mama en hombres

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Abstract

Objective: To evaluate the clinical, imaging and histopathological characteristics in benign breast lesions in men over a three-year period in a reference oncology center. **Methods:** Descriptive retrospective cohort study carried out on male patients treated at the Unidad Médica de Alta Especialidad No. 4 Luis Castelazo Ayala between the years 2021 and 2023, who came for some alteration of the mammary gland, confirming a diagnosis of benignity by imaging and histopathology. Descriptive statistics were used for the analysis of clinical, imaging and histopathological findings. **Results:** 20 male patients attended the breast oncology service; four patients were excluded for not meeting the established inclusion criteria, to obtain a population sample of 16 patients. The main benign histopathological finding was myofibroblastoma in 25% of patients. The main reason for consultation was the presence of a palpable nodule. **Conclusions:** Breast pathology in men is little known due to its low prevalence. Currently, there are no established protocols on its diagnostic and therapeutic approach. It is important to consider the risk factors and the findings obtained in the clinic, by imaging and histopathology, to treat them well.

Keywords: Breast. Male breast. Mammography. Echography. Benign lesion. Histopathology.

Resumen

Objetivo: Evaluar las características clínicas, imagenológicas e histopatológicas en lesiones benignas de mama en hombres en un periodo de 3 años en un centro oncológico de referencia. **Métodos:** Estudio descriptivo de cohorte retrospectiva efectuado en pacientes varones atendidos en la Unidad Médica de Alta Especialidad No. 4 Luis Castelazo Ayala entre los años 2021 y 2023, que acudieron por alguna alteración de la glándula mamaria, confirmandose por imagen e histopatología un diagnóstico de benignidad. Se utilizó estadística descriptiva para el análisis de los hallazgos clínicos, imagenológicos e histopatológicos. **Resultados:** Acudieron 20 pacientes al servicio de oncología mamaria y se excluyeron cuatro por no cumplir con los criterios de inclusión establecidos, con lo cual se obtuvo una muestra poblacional de 16 pacientes. El principal hallazgo histopatológico benigno fue el miofibroblastoma en el 25% de los pacientes. El principal motivo de consulta fue la presencia de un nódulo palpable. **Conclusiones:** La patología mamaria en hombres es poco conocida debido a su baja prevalencia. En la actualidad no existen protocolos establecidos sobre su abordaje diagnóstico y terapéutico. Es importante contemplar los factores de riesgo y los hallazgos obtenidos en la clínica, por imagen y por histopatología, para realizar un adecuado tratamiento.

Palabras clave: Mama. Mama masculina. Mastografía. Ecografía. Lesión benigna. Histopatología.

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Introduction

Although male breast disease is uncommon and therefore poorly understood, there is a wide variety of conditions. Certainly, the main concern at the time of consultation is that it may be a malignant process. However, most lesions of the male mammary gland are benign, with gynecomastia being the most common etiology¹.

Any male breast lesion must be carefully evaluated and not underestimated. Although male breast cancer is rare and represents only 1% of all cancers and 0.2% of deaths due to them, its incidence rate has increased by 26% in recent decades; still, it is considered a diagnosis of exclusion²⁻⁴.

Risk factors for the development of male breast lesions include age, cryptorchidism, testicular lesions, Klinefelter syndrome, hepatic dysfunction, family history of breast cancer, and thoracic trauma⁵.

It is important to understand the anatomy morphologically, since the breast, like in women, is composed of glandular and adipose tissues; however, in men, the glandular units consist only of ducts that are normally circumscribed beneath the nipple-areola complex. For this reason, lesions of the male mammary gland are rare⁶.

The most common clinical presentation is usually a palpable nodule with localized pain, which may or may not be accompanied by increased breast volume. Imaging modalities are essential to begin the diagnostic approach. Mammography, ultrasound, and magnetic resonance imaging are the main imaging modalities⁷. Of note, mammography has not demonstrated a statistically significant difference in sensitivity and specificity compared with ultrasound in male breast lesions⁸. Nevertheless, it is reasonable to begin the diagnostic protocol with mammography in patients older than 25 years or breast ultrasound in those younger than this age. There is no universally accepted consensus on the initial imaging approach in men, as this has been extrapolated from experiences in women^{7,9}.

On mammography, conditions such as gynecomastia may mimic chronic inflammatory conditions. Certainly, gynecomastia and breast cancer do not overlap, but the presence of a nodule and gynecomastia may coexist; however, biopsy is not recommended if only the latter is present. In general, nonvisible lesions in the male mammary gland tend to be benign, unlike radiolucent findings which, in women, are mostly benign but in men usually the opposite occurs⁵.

In cases of suspicious imaging findings, biopsy is required, which may be performed by fine-needle aspiration, excisional biopsy, or core-needle biopsy, the latter being preferred under ultrasound guidance due to the smaller volume of the male mammary gland and the technical difficulties that may arise⁷. Similarly, overdiagnosis must be avoided, taking into account the physical and psychological repercussions, as well as possible complications that may occur. It is important to choose less invasive tools, as most male breast lesions will prove to be benign^{10,11}.

The objective of this study is to evaluate the clinical, imaging, and histopathological characteristics of benign male breast lesions over a 3-year period in a reference oncology center.

Methods

We conducted a retrospective descriptive cohort study between 2021 and 2023 in patients seen at *Unidad Médica de Alta Especialidad No. 4 Luis Castelazo Ayala*. Inclusion criteria were male patients who attended the breast oncology service for one of the following reasons: palpable nodule, mastalgia, nipple discharge, or increased breast volume. Patients underwent imaging modalities such as ultrasound or mammography, and biopsy with histopathological study in the pathology department of the same center. Study variables included age, family history, reason for consultation, breast density, lesion characteristics (laterality, type, location, diameter, density or echogenicity), presence of calcifications, nipple retraction, skin thickening, presence of adenopathy, BI-RADS (Breast Imaging Reporting and Data System) classification, type of biopsy, and treatment. Exclusion criteria were female sex, histopathological reports obtained from a different center, or a positive report for malignancy. Elimination criteria included patients with incomplete health records, follow-up outside the study center, or those who did not provide informed consent for the use of their data.

The following findings were studied: gynecomastia, duct ectasia, myofibroblastoma, papillary lesion with atypia, fibroadenoma, mastitis, usual ductal hyperplasia, and tuberculosis.

Statistical analysis was performed using JASP version 0.17, employing descriptive statistics. All categorical variables are expressed as frequencies and percentages.

Results

Of the 20 male patients who attended the breast oncology service between 2021 and 2023, one was excluded because his histopathology report came from another center and it was not possible to review the slides; another because he received treatment outside the unit; and 2 due to incomplete health records.

The mean age of the study population was 61.5 years, and most (62.5%) had no family history of breast cancer. The main reason for consultation in our unit was the presence of a palpable nodule in 37.5%. Other reasons for consultation included mastalgia, nipple discharge, breast enlargement, palpable nodule with mastalgia, and nodule with nipple discharge. Regarding laterality, the most frequently affected breast was the right one (50%), followed by the left (37.5%), with bilateral involvement in 12.5% (Table 1).

The mean body mass index was 28 kg/m², with most patients (62.5%) falling within normal range. Chronic diseases reported included type 2 diabetes mellitus in 18.7% and systemic arterial hypertension in 43.8%; 37.5% of patients had no comorbidities (Table 1).

Regarding imaging, most patients (62.3%) received a BI-RADS category > 4, justifying biopsy to rule out a malignant process. The most frequently reported finding was the presence of a nodule (62.5%). Breast density patterns that predominated were type A (25%) and B (56.2%), that is, those with lower breast density. The main location of lesions was retroareolar, in half of the cases. Other less frequently reported findings included calcifications, nipple retraction, skin thickening, and adenopathy (Table 2).

Discussion

Most lesions of the male mammary gland are of benign etiology, with gynecomastia being the most frequent. The main reasons for consultation are breast enlargement, palpable nodule, and mastalgia¹. One of the greatest concerns at the time of consultation is that it may be a malignant process; although rare (< 1% of all cancers in men)¹², it is appropriate to include it in the diagnostic protocol.

The most important risk factors for male breast disease include age, overweight and obesity, radiation exposure, hormonal imbalance, and family history of breast cancer, with a significantly increased risk in those with BRCA2 gene mutation¹³.

It is important to correlate male breast lesions both by imaging and clinical findings to reduce unnecessary

Table 1. Demographic characteristics of the study population

Variable	Percentage (n = 16)
Mean age 61.56 years	
Family history	
Yes	37.5
No	62.5
Reason for consultation	
Palpable nodule	37.5
Mastalgia	6.2
Nipple discharge	12.5
Breast enlargement	6.2
Nodule + mastalgia	25
Nodule+nipple discharge	12.5
Laterality	
Right	50
Left	37.5
Bilateral	12.5
Body mass index (mean 28 kg/m ²)	
Normal	62.5
Overweight	12.5
Obesity	25
Comorbidities	
None	37.5
Type 2 diabetes mellitus	18.7
Systemic arterial hypertension	43.8

biopsy rates. In male patients, ultrasound has proven to be a useful imaging modality that reduces false-positive rates, although it does have certain limitations, such as evaluating posterior acoustic features in thinner tissues¹⁴.

In a study by Yuan et al.⁸ involving 125 patients, ultrasound characteristics of both benign and malignant lesions were highlighted. The most notable features of malignant lesions were eccentricity, mixed solid and cystic echotexture, irregular shape, poorly circumscribed margins, and nonparallel orientation.⁸ Most of the lesions in our study coincided with the benign features described by Yuan et al.⁸ such as periareolar location, hypoecho-genicity, and well-demarcated nodules (Table 2).

Biopsy should be reserved for cases in which a clinical finding is corroborated by imaging, while also taking into account the patient's intrinsic risk factors to rule out malignancy¹⁴.

In a study by Bicchierai et al.¹¹ core-needle biopsy was shown to have greater accuracy in characterizing male breast lesions vs fine-needle aspiration, and is therefore preferred as the first diagnostic tool. It has been reported that up to 15.3% of fine-needle aspirations in men are inadequate. In our series, 7

Table 2. Imaging characteristics of male breast lesions

Variable	Percentage (n = 16)
Breast density	
A	25
B	56.2
C	18.7
D	0
Lesion location	
Periareolar	18.7
Retroareolar	50
Upper outer quadrant	25
Lower inner quadrant	6.2
Type of lesion	
Nodule	62.5
Asymmetry	37.5
Echogenicity	
Hypoechoic	62.5
Isoechoic	31.2
Hyperechoic	6.2
Radiographic density	
Hypodense	18.7
Isodense	31.2
Hyperdense	50
Calcifications	
Yes	6.2
No	93.7
Nipple retraction	
Yes	6.2
No	93.7
Skin thickening	
Yes	12.5
No	87.5
Adenopathy	
Yes	31.2
No	68.7
Maximum lesion diameter 19.2 mm	
BI-RADS category	
2	31.2
3	6.2
4A	31.2
4B	6.2
4C	18.7
5	6.2

core-needle biopsies and 8 fine-needle aspirations were performed; in patients whose only clinical finding was a palpable nodule, core-needle biopsy was preferred (Table 3).

Gynecomastia is the most common alteration in the male population, with unknown etiology, although it is associated with metabolic, endocrine, neoplastic, or drug-induced disorders¹⁵. Fentiman et al.¹⁶ reported it as a common finding, observed in 40% to 55% of autopsies,

although in the present study it was not the most frequent. Clinically, it presents as breast hypertrophy with redundant skin, often in overweight patients¹⁶ (Fig. 1).

On radiologic examination, 3 patterns can be identified: nodular, dendritic, and diffuse glandular. Doppler ultrasound is preferred as the initial imaging modality, since it allows identification of increased vascularity typical of this inflammatory condition, unlike mammography, which shows a homogeneous radiolucent adipose layer¹⁷. Histologically, it is characterized by benign proliferations of subareolar and periductal ducts, as well as branching of lactiferous cells. It is hyperplastic, hypercellular tissue¹⁸. This condition has psychological repercussions due to the aesthetic appearance in patients, affecting self-esteem and generating body-image insecurity¹⁹.

In recent decades, the number of male patients seeking care for gynecomastia correction has increased. While observation is valid for breast lesions, some opt for surgical correction. Klinger et al.¹⁸ reported on a series of 148 patients who underwent procedures ranging from less invasive methods such as liposuction to subcutaneous mastectomies, most for cosmetic purposes. In our study, all patients with this alteration remained under surveillance (Table 4).

Myofibroblastomas are mesenchymal tumors derived from stromal fibroblasts, commonly found within breast parenchyma (Fig. 2). Their prevalence is low and only a few case reports exist, but, in our study, they were the most prevalent lesion, occurring in 4 patients (Table 5). Clinically, they present as painless palpable nodules. They have no specific imaging pattern; on mammography they appear as well-circumscribed, round or oval, dense, noncalcified nodules, and Doppler ultrasound may reveal increased peripheral vascularity²⁰⁻²² (Figs. 3 and 4).

Histologically, these lesions are composed of bundles of slender, uniform cells arranged in groups, separated by broad bands of hyalinized collagen (Fig. 5). Immunohistochemical analysis is important to differentiate them from other spindle-cell tumors such as spindle-cell lipoma and solitary fibrous tumor, as well as from malignant processes, especially spindle-cell carcinoma. Most are immunoreactive for CD34, actin, CD10, and desmin^{21,23}. The prognosis of these lesions is generally excellent, with complete surgical excision as the first-line therapy, without the need for adjuvant measures such as radiotherapy or hormone therapy²⁴.

Fibroadenomas, although the most common benign lesions in women, are not as frequent in men²⁵.

Table 3. Reason for first consultation and type of biopsy performed

Variable	Palpable nodule (n = 6)	Mastalgia (n = 1)	Nipple discharge (n = 2)	Breast enlargement (n = 1)	Nodule + mastalgia (n = 4)	Nodule + nipple discharge (n = 2)
Biopsy type						
Core-needle biopsy	5	1	0	0	1	0
Fine-needle aspiration	1	0	2	1	2	2
Excisional biopsy	0	0	0	0	1	0



Figure 1. Male patient with clinically evident gynecomastia in his right breast.

Ultrasound is the preferred imaging modality, showing hypoechoic nodules with well-demarcated borders and no vascularity on color Doppler (Fig. 3). Indications for excision include rapid tumor growth, persistence without spontaneous regression, symptoms such as mastalgia, and family history of breast cancer²⁶. In the present study, one patient was kept under monitoring and another underwent excision at his own request (Table 4).

Although papillary lesions in men are rare, their importance lies in the fact that papillary carcinoma is the 2nd most common subtype of breast cancer in men, representing 4%, after ductal carcinoma. The most common clinical presentation is a palpable nodule accompanied by nipple discharge in up to one-third of cases. Zhong et al.²⁷, in their experience with the largest male papillary lesion cohort, recommend fine-needle aspiration biopsy as the initial diagnostic procedure. In their cohort, all patients with benign papillary lesions underwent excisional treatment. In our series, 2 patients exhibited a breast nodule and nipple discharge; both underwent fine-needle aspiration biopsy. One subsequently underwent excisional treatment, while the other was kept under monitoring after refusing surgery. The prognosis of these lesions is generally favorable in most cases (Table 3).

Tuberculosis of the breast has been called “the great mimicker” because of its multifaceted presentations.



Figure 2. Benign male breast lesion consistent with myofibroblastoma.

Farrokh et al.²⁸ described 32 cases of breast tuberculosis, only 1 of which was reported in a man, reflecting the rarity of this disease in men. In women, it has been described mainly in those who are lactating, with predisposition to this infection due to hypervascularity and ductal dilatation²⁸.

Clinically, it usually presents as a solitary palpable nodule, sometimes accompanied by skin changes such as nipple retraction or peau d’orange, making it imperative to rule out carcinoma. On mammography, it may appear as a well-circumscribed nodule, occasionally mimicking a fibroadenoma²⁹. However, the most valuable imaging modality is ultrasound, as it not only allows correct assessment of the lesion but also enables targeted biopsy, preferably by fine-needle aspiration,

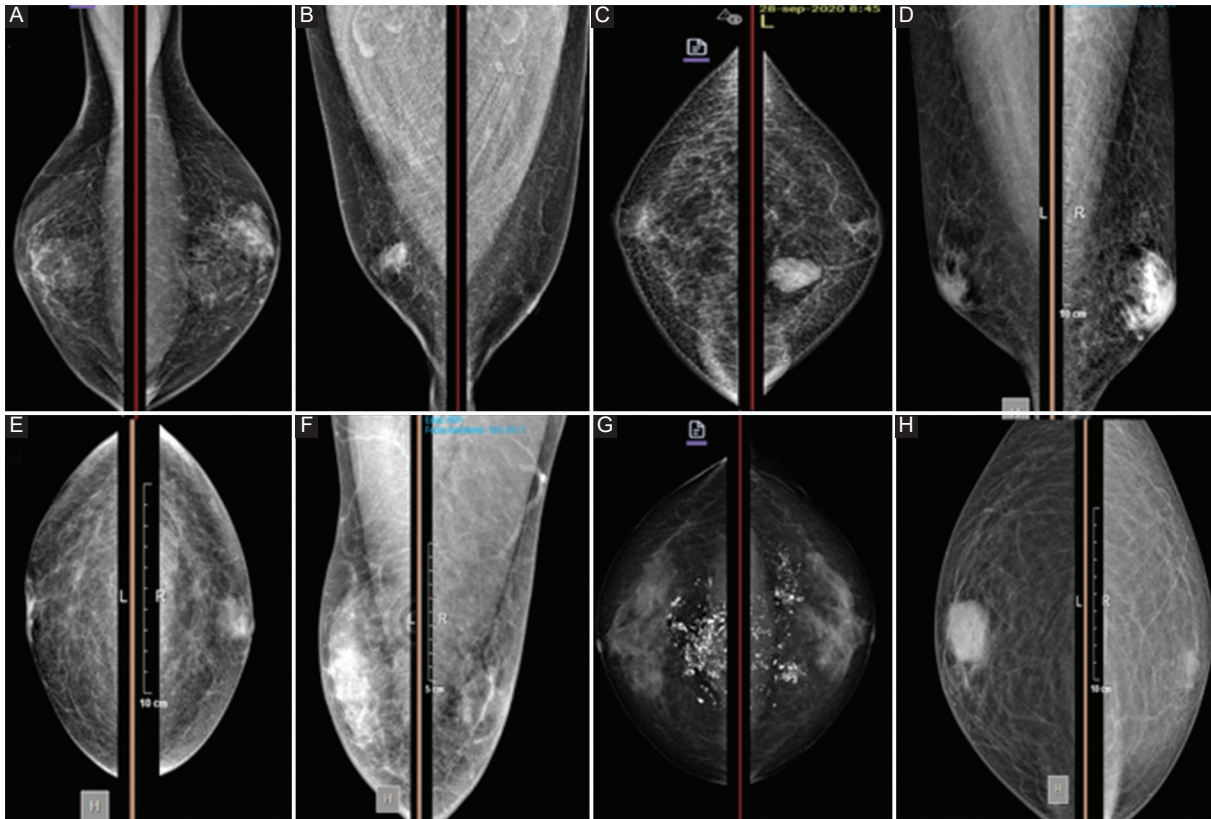


Figure 3. Mammographic characteristics of benign breast lesions in men. **A:** craniocaudal view showing bilateral breast enlargement with architectural distortion. Biopsy reported bilateral gynecomastia. **B:** craniocaudal view showing a hyperdense nodule with irregular features in the right breast; histopathology indicated mastitis. **C:** craniocaudal view showing a hyperdense, well-demarcated nodule in the inner quadrants and posterior third of the left breast; histopathology indicated myofibroblastoma. **D:** mediolateral oblique view showing a poorly defined, retroareolar hyperdense nodule involving the upper and lower quadrants of the left breast; histopathology indicated usual ductal hyperplasia. **E:** craniocaudal view showing a poorly defined retroareolar nodule in the left breast; histopathology indicated fibroadenoma. **F:** mediolateral oblique view showing an irregular hyperdense area in the middle third of the right breast, involving upper and lower quadrants; histopathology reported a papillary lesion. **G:** craniocaudal view showing architectural distortion in the left breast involving both external and internal quadrants. Multiple benign-appearing calcifications are present in both breasts. Histopathology indicated duct ectasia. **H:** craniocaudal view showing a well-defined retroareolar hyperdense nodule in the right breast; ultrasound-guided fine-needle aspiration drained the lesion, and histopathology indicated tuberculosis.

Table 4. Treatment used according to histopathological findings

Histopathological finding	Monitorization (%)	Wide excision (%)	Addair surgery (%)	Total mastectomy (%)	Antibiotic (%)
Findings					
Myofibroblastoma	-	75	-	25	-
Gynecomastia	100	-	-	-	-
Fibroadenoma	50	50	-	-	-
Papillary lesion	50	-	50	-	-
Duct ectasia	50	50	-	-	-
Acute mastitis	100	-	-	-	-
Usual ductal hyperplasia	-	100	-	-	-
Tuberculosis	-	-	-	-	100

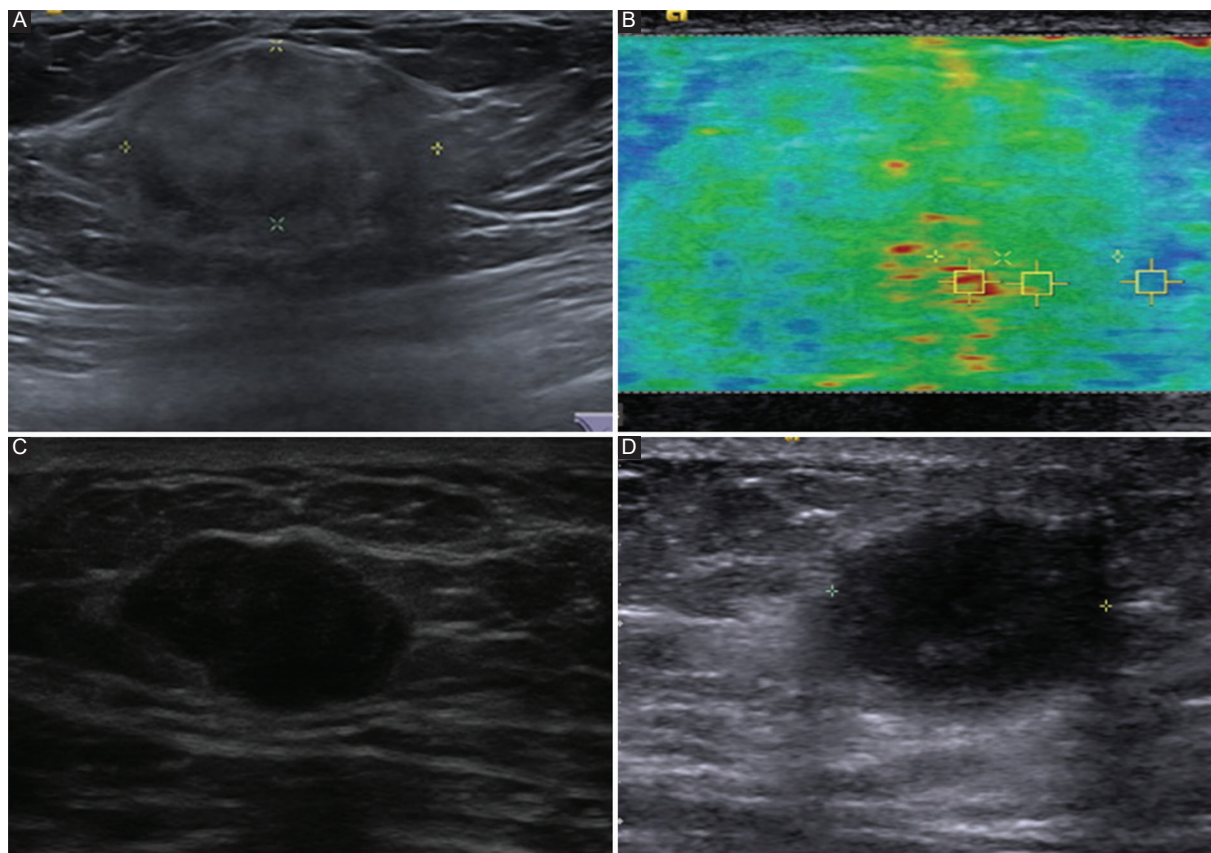


Figure 4. Ultrasonographic and elastographic features of benign breast lesions in men. **A:** ultrasound showing an isoechoic, well-defined nodule; histopathology indicated myofibroblastoma. **B:** elastography showing tissue stiffness, which aided diagnosis along with histopathology confirming myofibroblastoma. **C:** ultrasound showing a hypoechoic nodule with irregular borders, wider than tall; histopathology indicated fibroadenoma. **D:** ultrasound showing a well-demarcated hypoechoic nodule; histopathology indicated fibroadenoma.

Table 5. Case frequency by histopathological diagnosis

Findinga	Cases (n)	Percentage (%)
Myofibroblastoma	4	25
Gynecomastia	3	18.7
Fibroadenoma	2	12.5
Papillary lesion	2	12.5
Duct ectasia	2	12.5
Acute mastitis	1	6.2
Usual ductal hyperplasia	1	6.2
Tuberculosis	1	6.2

which also permits percutaneous drainage³⁰. In the present study, one case of breast tuberculosis was found, in which ultrasound-guided fine-needle aspiration biopsy was performed, followed by drainage and

antibiotic therapy, which is the most widely used treatment in cases reported in the international literature^{28,29}. (Table 4).

Ductal hyperplasia is characterized by intraductal epithelial cell proliferation, with or without atypia. In men, it usually appears in those who clinically present with gynecomastia. On mammography, findings are generally nonspecific and may appear as a nodule or as amorphous microcalcifications (Fig. 3). In our study, only 1 case was observed, which may be due to the lack of a specific imaging pattern to guide its diagnosis⁷. (Table 5).

On the other hand, mastitis are processes due to infections of the mammary tissue, which may occasionally lead to abscess formation. On mammography, it may appear as unilateral breast enlargement with trabecular and skin thickening. Clinical correlation is essential for establishing an accurate diagnosis. Duct ectasia affects the retroareolar ducts and may sometimes be accompanied by nipple discharge,

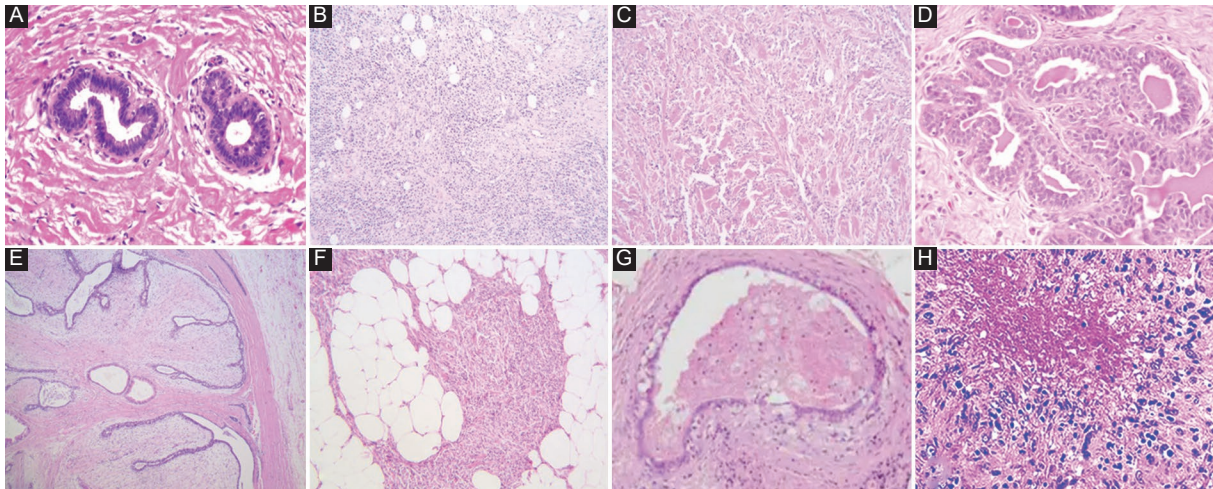


Figure 5. Histological features of benign male breast lesions. **A:** ducts showing epithelial hyperplasia surrounded by hypocellular myxomatous stroma; edematous stroma with abundant mucopolysaccharides. Reported as gynecomastia. **B:** inflammatory response with lymphocytes and plasma cells. Reported as mastitis. **C:** bundles of thin, uniform spindle-shaped mesenchymal cells arranged in groups separated by hyalinized collagen bands; no cytologic atypia or mitotic activity. Reported as myofibroblastoma. **D:** cells with oval, normochromatic nuclei and no mitotic activity. Concluded as usual ductal hyperplasia. **E:** biphasic neoplasm with epithelial and benign spindle-cell components, well circumscribed. Reported as fibroadenoma. **F:** papillary lesion without atypia, showing apocrine metaplasia. **G:** inflammatory infiltrate around the duct, with macrophages and spongiform cells. Reported as duct ectasia. **H:** granulomas with Langhans giant cells and caseous necrosis, consistent with breast tuberculosis.

as occurred in our patients. On mammography, dense structures converging toward the nipple–areola complex can be seen, sometimes with associated calcifications. On ultrasound, central or peripheral cellular debris may be observed⁴.

Conclusions

Male breast disease remains poorly understood due to its low prevalence. Although most lesions are related to benign processes, it is important to inquire about the patient's history and identify risk factors for malignancy, in addition to obtaining a thorough history of symptoms and performing an adequate physical examination.

Imaging modalities are auxiliary tools in the diagnosis of male breast disease, but unlike in women, the information obtained is more limited due to the anatomical characteristics of the male mammary gland. To date, there is no consensus on the indications for imaging in men, but in the presence of suspected lesions, they are of great help for guiding biopsies. Although breast cancer in men accounts for < 1% of all cases, it must be included in diagnostic protocols; in cases of suspicious imaging findings, and considering risk factors, biopsy is warranted to establish a histopathologic diagnosis as part of a proper triple test (clinical, imaging, and histopathology). Management will depend on this, helping

to avoid overtreatment of benign lesions, which are the most prevalent.

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Conflicts of interest

The authors declared no conflicts of interest whatsoever.

Ethical considerations

Protection of humans and animals. The authors declare that no experiments on humans or animals were conducted for this research.

Confidentiality, informed consent, and ethics approval. The authors followed their institution's confidentiality protocols, obtained informed consent from patients, and received approval from the Ethics Committee. The recommendations of the SAGER guidelines were followed, according to the nature of the study.

Declaration on the use of artificial intelligence. The authors declare that no generative artificial intelligence was used in the preparation of this manuscript.

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