Original Article

Eur J Breast Health 2023; 19(4): 304-310
DOI: 10.4274/ejbh.galenos.2023.2023-5-2

Is Breast Imaging in Male Patients With Benign Lumps Necessary? A Retrospective Study to Assess Concordance Between Clinical Diagnosis and Imaging Findings

Cleofina Furtado[1], Aleksandra Stankiewicz[1], Jana Klcova[1], Mahrukh Khan[1], Saba Bajwa[1], Zatinahhayu Mohd Isa[2]

[1]Department of Diagnostic and Interventional Radiology, University Hospitals of North Midlands, Stafford, United Kingdom
[2]Department of Imaging, Mid Cheshire NHS Foundation Trust, Cheshire, United Kingdom

ABSTRACT

Objective: Breast imaging for male patients is a controversial topic due to the high prevalence of gynecomastia compared to male breast cancer. Worldwide, men are undergoing more breast imaging despite the low incidence of male breast cancer. Gynecomastia is a benign condition, but the anxiety it causes and unnecessary medical costs are still high.

Materials and Methods: In accordance with Royal College of Radiology guidelines, a retrospective study was performed in two cycles to determine if mammography or ultrasound should be included in the workup of male patients who were referred to a breast care unit for a lump that was deemed benign by doctors.

Results: There was 100% concordance between clinical diagnosis and imaging findings.

Conclusion: In this population imaging was not necessary in cases of probable gynecomastia and benign conditions found during a clinical assessment. Standardised patient assessment methods can improve care and ensure accurate evaluation.

Keywords: Breast imaging; gynaecomastia; male breast

Cite this article as: Furtado C, Stankiewicz A, Klcova J, Khan M, Bajwa S, Isa ZM. Is Breast Imaging in Male Patients With Benign Lumps Necessary? A Retrospective Study to Assess Concordance Between Clinical Diagnosis and Imaging Findings. Eur J Breast Health 2023; 19(4): 304-310

Key Points

- Breast imaging for men is controversial due to the high prevalence of gynecomastia compared to male breast cancer.
- Most male breast lumps are diagnosed as gynecomastia, but other benign conditions include lipoma, epidermal inclusion cyst, breast hematoma, fat necrosis, and abscess.
- Malignancy was detected in only 1.65% of cases in the first cycle, and 0.8% of cases in the second cycle, with breast cancer in men being relatively rare.
- Gynecomastia is a benign condition that can affect between 32% and 66% of men in their lifetime.
- Comprehensive evaluation of male breast symptoms requires thorough history and examination to avoid unnecessary imaging and patient anxiety.

Introduction

In the last few years, the number of male patients who complain of breast lumps and discomfort has increased significantly (1). Recent epidemiological studies show that in the last 20 years the number of men who complain about breast discomfort has increased from 0.8% up to 2.4% (2). About 57% of men older than 44 years have a palpable breast (3).

The most frequent male breast condition is gynecomastia, a benign growth of glandular tissue, followed by lipomas and epidermal inclusion cysts (4). Men can also develop angiolipoma, schwannoma, and intraductal papillomas, which are benign breast diseases (5). In addition to these pathologies, several benign non-cancerous diseases can affect the male breast, including secondary syphilis, nodular fasciitis, hematoma, fat necrosis, subareolar abscess, venous malformation, intramammary lymph node, and diabetic mastopathy (6).

The use of breast imaging in male patients has become a topic for discussion due to the rising prevalence of male breast complaints (7, 8). Numerous studies have demonstrated that the majority of male breast problems can be diagnosed just by clinical examination (9). However, some scientists have argued that imaging may be required

Corresponding Author:
Cleofina Furtado; cleofinafurtado@gmail.com

Received: 23.05.2023
Accepted: 13.08.2023
Available Online Date: 01.10.2023

when the clinical diagnosis is ambiguous or the patient is at a high risk of breast cancer (3).

"Triple assessment", which combines clinical evaluation, imaging, and needle biopsy has been used for diagnostic evaluation in men with breast complaints (10).

The tests conducted in each situation depend on the patient's age, clinical results, and symptoms (10). The first-line imaging technique for patients under 40 years old is ultrasound (US) (11). Patients between the ages of 35 and 39 who have clinically suspicious findings (P4 or P5) and/or ultrasonically suspicious findings (U4 or U5) should get a mammogram, ideally before getting a biopsy (3). When a palpable mass on mammography is hidden or only partially imaged, targeted US is necessary (11). US is reported to have higher sensitivity and specificity than mammography and is therefore the most sensitive for male breast cancer (11). For suspected or uncertain masses, a biopsy is required and is frequently attainable with US guidance (12).

Objective

This study sought to determine whether mammography or US should be included in the diagnostic workup of men with gynecomastia referred with a breast lump to the breast care center. The study also aimed to determine whether men referred because of a breast lump met the guidelines of the Royal College of Radiology (RCR), and the Association of Breast Surgery (ABS) (13, 14).

Standards

According to guidelines developed by the RCR and the ABS, mammography and/or ultrasonography are recommended in cases of unaccounted for or suspicious unilateral breast growth (P4 or 5) of the male breast. Imaging may be used in cases where there is clinical uncertainty (P3) regarding the difference between gynecomastia or fatty breast enlargement.

In males younger than 50 years, the preferred method of imaging is US, whereas bilateral mammography or US is recommended in those older than 50. Following imaging, needle core biopsy should be performed in cases where radiological findings are uncertain or suspicious (P3–5 and or R3–5), or when indeterminate clinical findings (P3) are not sufficiently explained by benign imaging findings (13-15).

Materials and Methods

A retrospective audit was conducted involving male patients who attended the two-week wait clinic in the Breast Care Unit at our institute between January 2019 and October 2019 (n = 303) for the first cycle, and between December 2021 and June 2022 (n = 117) for the second cycle.

The second audit cycle was conducted following the presentation and awareness of audit findings. The 'rolled-nipple' technique, which is a well-known method, can be used to visualize subareolar ducts and was recommended for use in evaluation in suspected cases of gynaecomastia. Excluded cases included axillary lump, post-surgery surveillance cases, and paediatric cases. Depending on the age of the patient, radiological imaging was done either as mammography, or US. The P (Palpable) value grade given by a breast surgeon was recorded, as well as the M/U/R (Mammography/US/Radiological) values reported by radiologists. The pathological results of biopsies have also been recorded. The concordance between radiological and clinical diagnoses was assessed.

Results

In the first cycle (n = 303), the majority of cases (75.6%, n = 229) were diagnosed with gynaecomastia followed by lipoma 7.6% (n = 23), and normal breast tissue 7.6% (n = 23). The remaining cases were: abscess 1.0% (n = 3); sebaceous cyst 1.0% (n = 3); fat necrosis 0.3% (n = 1); lipoma with gynecomastia 1.0% (n = 3); lymph node 1.0% (n = 3); resolving bruise 0.3% (n = 1); pseudogynaecomastia 1.32% (n = 4); haematoma 0.6% (n = 2); oedematous breast 0.3% (n = 1); and cyst 0.6% (n = 2). Malignancy was detected in only 1.65% of cases (n = 5), of which two were incidentally detected on routine computed tomography (CT). Biopsy was performed in a total of eight patients (2.6%), which confirmed five cases of malignancy, four of which were invasive breast carcinomas, and one Hodgkin's lymphoma. The other three biopsied patients were histologically proven as gynaecomastia.

The second cycle (n = 117), following presentation of the audit findings and recommended practice change, showed a decline in the proportion of gynaecomastia cases to 58.1% (n = 68) and a rise in lipoma cases to 15.4% (n = 18) compared to the first cycle. The remaining cases were: abscess 1.7% (n = 2); sebaceous cyst 2.6% (n = 3), epidermoid cyst 1.7% (n = 2), lymph node 0.85% (n = 1), pseudogynaecomastia 1.7% (n = 2), haematoma 3.4% (n = 4), oedematous breast 0.85% (n = 1), simple cyst 1.7% (n = 2) and normal breast tissue 11.1% (n = 13). Malignancy was detected in only 0.85% of cases (n = 1), which was proven to be papillary ductal carcinoma *in situ* (DCIS) with no invasive disease. Biopsy was performed in four cases (3.4%) and only one was proven to be malignant. The P grading for the malignant case was P5. Among the other three, two were histologically proven as epidermoid cyst and one gynaecomastia.

In the first cycle, four of the malignant cases were in the age group of 60–80 years and one between 40–50 years, the latter being a case of Hodgkin's lymphoma. The one malignant case in the second cycle was in the age group of >90 years.

We observed 100% concordance in both audit cycles between clinical diagnosis and imaging results when comparing the P grading given by clinicians for benign lesions as P2 and were concordantly found to be benign on imaging with R grading of R2. Thirty-seven (31.6%) patients were graded as P3 by the clinicians in the second cycle. Of these, only three were graded as R3 on imaging and underwent a biopsy, although none proved to be malignant and demonstrated results of benign findings. In contrast in the first cycle, ten (3%) patients were graded as P3 by the clinicians but only one was graded as R3 and underwent a biopsy which proved to be non-malignant (Table 1).

In the first cycle, 45% of patients had a mammogram, 32% had US only, and 23% had both imaging modalities. In the second cycle, 31% of patients had a mammogram, 33% had US only, and 36% had both imaging modalities. The *p*-value 0.0001 indicated that, significantly,

Table 1. Comparison of clinical grading (P) given by clinicians between the first and second audit cycle

P grading	P1/2	P3	P4/5	Biopsy
First cycle	288 (95%)	10 (3%)	5 (2%)	14 (4.2%)
Second cycle	79 (67.5%)	37 (31.6%)	1 (0.85%)	4 (3.4%)

despite the change in proportion of patients who is undergoing different imaging modalities, consistently similar results were observed in both the audit cycles as mentioned in Table 2.

Following the second cycle, there was a decline in P1/P2 referrals (-29.5%) and a steep rise in P3 grading referrals (+28.6%), increasing from 3% to 31.6%. However, only 8% of the P3 referrals were radiologically considered indeterminate/suspicious. Further, the p-value of 0.001 suggested similar proportion to the first cycle as mentioned in Table 3.

Discussion and Conclusion

Seventy five percent of cases in the first cycle were diagnosed with gynaecomastia, followed by smaller proportions for lipoma and normal breast tissue. Malignancy was detected in only five of 303 cases, and among the five malignant cases, two were detected on prior CT as incidental findings. The second cycle showed a decline in the proportion of gynaecomastia cases and a rise in lipoma cases compared to the first cycle, although the gynaecomastia cases outnumbered the lipoma cases by almost 4:1. Malignancy was detected in only 0.85% of cases, which was proven to be papillary DCIS with no invasive disease. Results show that breast cancer in men is less common than in women (7, 16).

Breast cancer in men is relatively rare, affecting only around 1% and not being included in the top 20 cancers (16). Gynecomastia, on the other hand, is a condition that can affect up to two-thirds of men in their lifetime (17). It is therefore important to distinguish this group from other patients with lower malignant conditions (18).

Table 2. Chi-square test through SPSS. Referral patterns * change in imaging modality chi-square tests

	value	df	asymptotic significance (2-sided)
Pearson chi-square	218.900[a]	99	0.000
Likelihood ratio	148.653	99	0.001
Linear-by-Linear association	45.587	1	0.000
N of valid cases	100		

[a]: 118 cells (98.3%) have expected count less than 5. The minimum expected count is 0.02

Table 3. Chi-square test through SPSS. Referral patterns * radiological assessment chi-square tests

	value	df	asymptotic significance (2-sided)
Pearson chi-square	218.900[a]	99	0.000
Likelihood ratio	148.653	99	0.001
Linear-by-Linear association	45.587	1	0.000
N of valid cases	100		

[a]: 118 cells (98.3%) have expected count less than 5. The minimum expected count is 0.02

A soft, tender, mobile subareolar mass is the classic presentation of gynecomastia (Figure 1-4) (19). A mass outside of the subareolar region is not considered to be gynecomastia (20). Moreover, gynecomastia does not increase the risk of developing male breast carcinoma (16). Patients with palpable breast tissues who are asymptomatic need only to undergo a thorough physical exam and a detailed history (8). For patients with symptoms of gynecomastia, laboratory blood tests may be performed to determine the underlying cause (21). It will reduce unnecessary anxiety among patients (7, 8). This will also improve the cost-effectiveness of the imaging department (7).

The prevalence of gynecomastia increases with age (21). Most patients presenting with breast symptoms were 51–70 years in the present study (22). The prevalence of gynecomastia is known to increase with age, and studies have shown that the majority of patients presenting with breast symptoms are between the ages of 51 to 70. A study conducted by Johnson and Murad (20) found a similar prevalence of 57% of gynecomastia in men over the age of 44. These findings indicate that the risk for developing gynecomastia is higher with age, and that

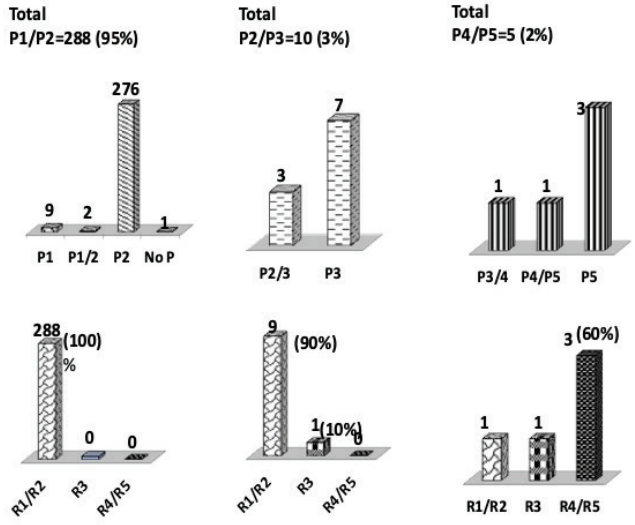

Figure 1. Evaluating concordance between clinical grading (P) and radiological grading (R) in the first audit cycle

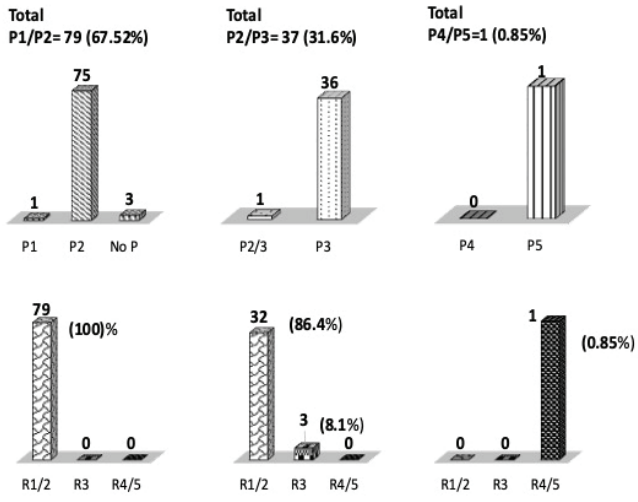

Figure 2. Evaluating concordance between clinical grading (P) and radiological grading (R) in the second audit cycle

healthcare professionals should be aware of that when evaluating males with breast symptoms (18). In addition, it has been reported that breast tissue may be palpable in 30% or more of the middle-aged adult male population, which increased to 60% or more by the seventh decade (23). In addition, the study found that gynecomastia is the leading cause of breast tissue enlargement in men older than 50 years (18). These findings emphasize the importance of taking patient age into account when evaluating males with breast symptoms (17).

Recent studies suggest that certain medications and medical conditions may also increase the risk for developing gynecomastia (20). Gynecomastia has been linked to obesity, liver disease and testicular tumours (17, 19). Some medications, including spironolactone and cimetidine, as well as some antipsychotics have been associated with the development of gynecomastia (24, 25). A comprehensive evaluation of males with breast symptoms should include a detailed medical history and physical examination that can determine the cause (26).

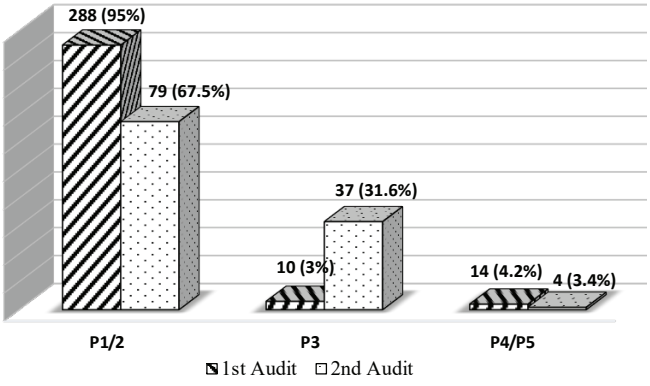

Figure 3. Comparison of clinical grading (P) given by clinicians between the first and second audit cycles

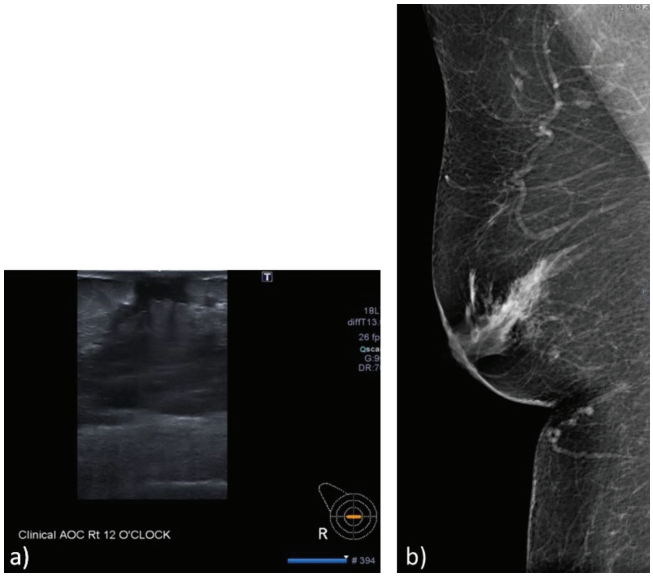

Figure 4. Gynaecomastia. A 56-year-old male patient presented with a three-week history of painful swelling in his right breast. The patient had a known history of excessive alcohol intake. a) On the ultrasound, the breast tissue appears to be hypoechoic, with scattered glandular tissue and fibrous strands. b) The mammogram shows "flame-like" features emanating from the right nipple at the 12 o'clock position, consistent with gynaecomastia. No evidence of suspicious microcalcifications or masses

Lipoma, epidermal inclusion cyst, breast hematoma, fat necrosis, diabetic mastopathy, intramammary lymph nodes, and subareolar abscess are some of the other benign and rare conditions that may be encountered in the male breast (27). These conditions present with varying clinical characteristics, and a proper clinical history is necessary to establish the correct diagnosis (1). In our study these pathologies accounted cumulatively for 15.8% in the first cycle and 33.7% in the second cycle. Sebaceous cysts or epidermal inclusion cysts are benign intradermal lesions that present as a firm non-tender lump (Figure 5) (28). Lipomas are benign mesenchymal lesions made up of mature adipose tissues (Figure 6) (29). They typically appear as a soft, mobile and painless lump that can be palpated in the breast (30). This is the second most common cause for male breast lumps after gynaecomastia (29, 30). Our study found 7.5% in first cycle and 13.3% in second

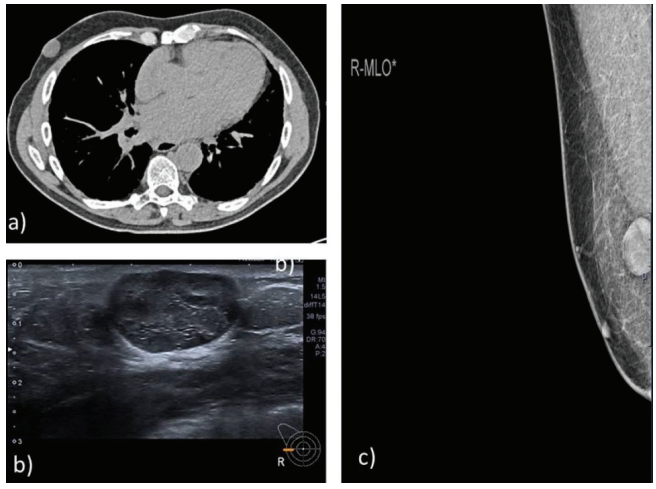

Figure 5. Epidermal inclusion cyst. a) Non-contrast CT scan revealed an incidental, oval-shaped lesion with well-defined margins located in the epidermis of the right breast. b) Ultrasound of the same lesion, demonstrated a well-defined, hypoechoic lesion with internal echoes caused by the presence of keratin and sebaceous material and a small central punctum/tract at the superficial aspect. c) Mammogram showed a well-defined lesion in the same breast with slightly increased density compared to the surrounding tissue. No other suspicious lesions or microcalcifications were present

CT: Computed tomography

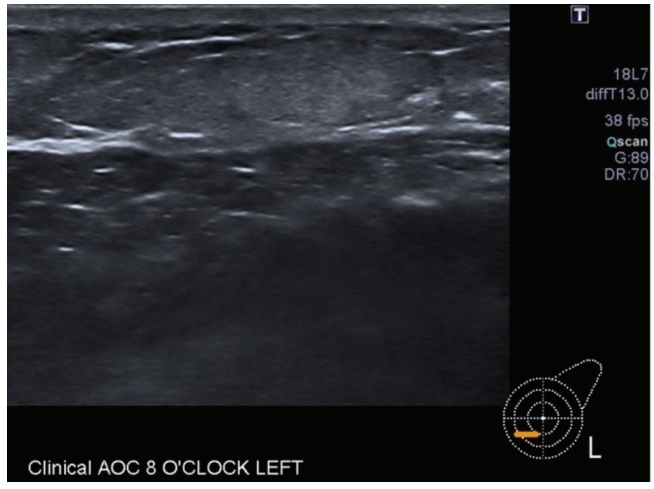

Figure 6. Lipoma. A well-defined hyperechoic lesion consistent with a lipoma observed on ultrasound. This was found in a 64-year-old man who presented with a lump in his left breast that had been present for four months

cycle. Pseudogynecomastia, which is caused by excessive fat deposits in the breast region, is rare (31). It is bilateral and has no palpable lump (31). Intramammary lymph nodes are typically found in the upper outer quadrant of the breast (Figure 7) (1). Breast hematomas can be mistaken for breast cancer if they are not interpreted correctly (30, 32). This includes hematomas that result from surgery, direct trauma, biopsy or contusion (Figure 8) (32). Fat necrosis in male breasts is rare and can be caused by a variety of factors, such as blunt trauma, prior breast surgery, radiotherapy or anticoagulant usage (33). Subareolar abscesses can present as a localized abscess or infection secondary to chronic obstruction and inflammation, and/or pain and swelling of the nipples (Figure 9) (34).

Our data showed that referrals for P1/P2 decreased during the second phase. This decline may be due to increased awareness of benign male disease by clinicians and radiologists after the presentation of the audit findings, as well as implementation of recommended change.

During the second phase, there was also a substantial rise in referrals for P3 grading, ten times higher in the second cycle compared to the first. However, the proportion of P3 referrals that were radiologically classified as indeterminate or suspicious remained relatively low at 8%, similar to the first cycle at 10%, where, p-value of 0.0001 which is less than the significant level of 0.005, indicated the similarity in both cycles It suggests that the increase in referrals for P3 was more due to over-caution by clinicians and an overuse than to a rise in suspicious cases.

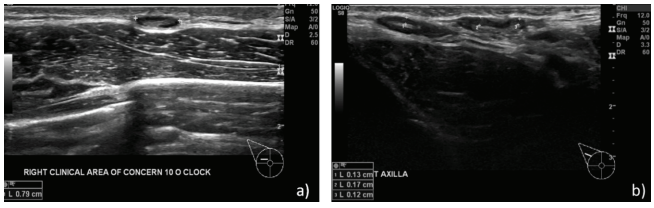

Figure 7. Intramammary lymph node. A 21-year-old male presented with a lump that had been noticed 12 months earlier. At the 10 o'clock position on the chest wall close to the nipple, there is a well-defined, oval-shaped lesion with an isoechoic center encircled by a hypoechoic rim, measuring 8x8x2 mm. These features are consistent with a normal intramammary lymph node, with a cortical measurement of 1 mm. b) shows a scan of the right axilla to confirm completeness, and similar lymph nodes of normal size and morphology are seen. Together, these images suggest that the lump noticed by the patient was likely due to a normal intramammary lymph node, rather than a malignant or benign mass

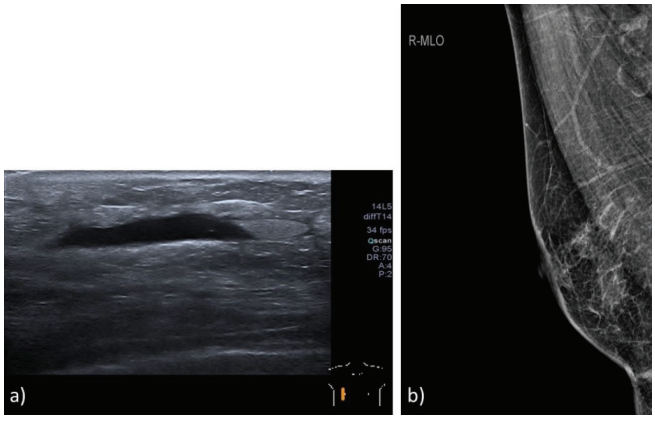

Figure 8. Resolving hematoma. A 67-year-old male patient presented with a lump in his right breast following an injury four weeks earlier. a) The ultrasound reveals a hyperechoic area within the outer breast tissue, with an irregular shape and indistinct borders associated with an anechoic component. b) The mammogram shows diffuse density in the right breast. No other suspicious findings are seen in either breast. These findings are consistent with the patient's history of breast injury and suggest that the lump is likely due to a benign post-traumatic hematoma

The importance of radiological imaging in male breast assessment becomes apparent when considering the 37 patients who were referred as suspicious or indeterminate by clinicians in first cycle and 10 in second cycle (P3). Remarkably, only three of them were finally categorized as indeterminate following radiological imaging in the first cycle and only one in the second cycle (R3). This finding underscores the pivotal role that radiological imaging plays in evaluating patients falling within this ambiguous category. By offering objective and precise information, radiological imaging serves as a powerful tool in distinguishing between benign and malignant findings, ultimately facilitating well-informed management decisions and minimizing the need for unnecessary interventions.

The present study also showed that the concordance between clinical diagnosis (P1/2) and imaging results (R1/2) was 100% in both audit cycles for lesions thought to be benign by the clinicians. This suggests that the clinical examination was reliable and accurate in diagnosing benign breast diseases in men.

It is important to note that false positives and negatives can be a potential downside of the imaging methods used to diagnose breast disease in men (18). False positives may lead to an unnecessary biopsy or increased anxiety among patients (8). False negatives could result in a delayed diagnosis and treatment that leads to worse outcomes (7). It is important to weigh the pros and cons of male imaging to provide the best care for patients (7, 8).

In the last few years, there has been a notable increase in males presenting with breast complaints, with gynecomastia being the most prevalent condition. Other benign non-neoplastic entities can also affect the male breast. The role of imaging for male breast assessment is still a matter of debate. However, a clinical examination may be sufficient in most cases. Imaging may be used in cases where there

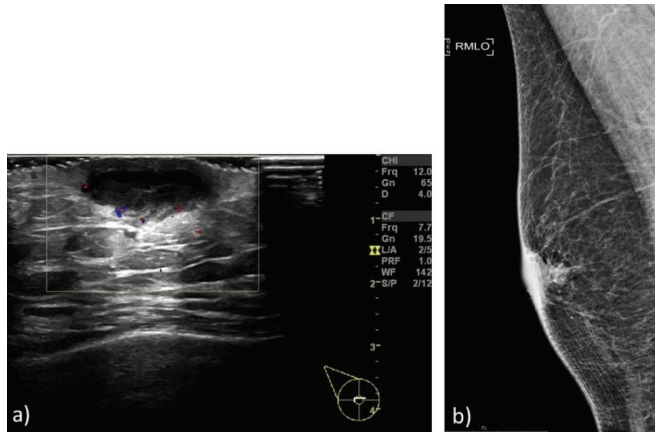

Figure 9. Abscess. A 43-year-old male patient presented with right breast pain and nipple discharge, and a history of previous nipple piercing on that side. a) The ultrasound reveals a retroareolar collection measuring 22x7x22 mm, with surrounding hyperemia and edematous tissues in keeping with inflammation. b) Mammogram, shows a focal area of increased density in the retroareolar with indistinct margins and associated skin thickening

is suspicion of malignancy, or if the physical examination results are inconclusive. Imaging is not recommended for gynecomastia, or lumps that have benign characteristics on clinical examination. Further research is required to elucidate the optimal role of imaging in male breast assessment. This will ensure that patients receive the best possible care.

Ethics Committee Approval: Not necessary.

Informed Consent: Retrospective study.

Peer-review: Externally peer-reviewed.

Authorship Contributions

Surgical and Medical Practices: C.F., A.S., J.K., M.K., Z.M.I.; Concept: S.B., Z.M.I.; Design: C.F., A.S., Z.M.I.; Data Collection or Processing: C.F., A.S., J.K., M.K., S.B.; Analysis or Interpretation: C.F., A.S., J.K., S.B., Z.M.I.; Literature Search: C.F., A.S., J.K., M.K.; Writing: C.F., A.S., J.K., M.K., Z.M.I.

Conflict of Interest: No conflict of interest was declared by the authors.

Financial Disclosure: The authors declare that this study received no financial disclosure.

References

1. Iuanow E, Kettler M, Slanetz PJ. Spectrum of disease in the male breast. AJR Am J Roentgenol 2011; 196: 247-259. (PMID: 21343472) [Crossref]
2. Şafak KY. Mammography Findings of Male Breast Diseases. J Breast Health 2015; 11: 106-110. (PMID: 28331703) [Crossref]
3. Adibelli ZH, Oztekin O, Postaci H, Uslu A. The diagnostic accuracy of mammography and ultrasound in the evaluation of male breast disease: A new algorithm. Breast Care (Basel) 2009; 4: 255-259. (PMID: 20877664) [Crossref]
4. Park YM, Park JS, Lee SJ. Various Causes of Male Breast Lumps: Pictorial Review With Pathologic Correlation. Ultrasound Med Biol 2013; 39(Suppl): 40. [Crossref]
5. Yuan WH, Li AFY, Chou YH, Hsu HC, Chen YY. Clinical and ultrasonographic features of male breast tumors: A retrospective analysis. PLoS One 2018; 13: e0194651. (PMID: 29558507) [Crossref]
6. Nguyen C, Kettler MD, Swirsky ME, Miller VI, Scott C, Krause R, et al. Male breast disease: Pictorial review with radiologic-pathologic correlation. Radiographics 2013; 33: 763-779. (PMID: 23674773) [Crossref]
7. Healy NA, Parag Y, Wallis MG, Tanner J, Kilburn-Toppin F. Outcomes of male patients attending the symptomatic breast unit: adherence to local and national imaging guidelines and effectiveness of clinical examination and imaging in detecting male breast cancer. Clin Radiol 2022; 77: 64-74. (PMID: 34716007) [Crossref]
8. Lapid O, Siebenga P, Zonderland HM. Overuse of imaging the male breast - Findings in 557 patients. Breast J 2015; 21: 219-223. (PMID: 25772378) [Crossref]
9. Johansen Taber KA, Morisy LR, Osbahr AJ 3rd, Dickinson BD. Male breast cancer: risk factors, diagnosis, and management (Review). Oncol Rep 2010; 24: 1115-1120. (PMID: 20878100) [Crossref]
10. Nigam M, Nigam B. Triple Assessment of Breast – Gold Standard in Mass Screening for Breast Cancer Diagnosis. IOSR JDMS 2013; 7: 1-7. [Crossref]
11. McCavert M, O'Donnell ME, Aroori S, Badger SA, Sharif MA, Crothers JG, et al. Ultrasound is a useful adjunct to mammography in the assessment of breast tumours in all patients. Int J Clin Pract 2009; 63: 1589-1594. (PMID: 19686337) [Crossref]
12. Fajardo LL, Pisano ED, Caudry DJ, Gatsonis CA, Berg WA, Connolly J, et al. Stereotactic and Sonographic Large-Core Biopsy of Nonpalpable Breast Lesions: Results of the Radiologic Diagnostic Oncology Group V Study. Acad Radiol 2004; 11: 293-308. (PMID: 15035520) [Crossref]
13. The Royal College of Radiology. Guidance on screening and symptomatic breast imaging [Internet]. 2019 [cited 2022 Aug 28]. Available from: https://www.rcr.ac.uk/system/files/publication/field_publication_files/bfcr199-guidance-on-screening-and-symptomatic-breast-imaging.pdf [Crossref]
14. Association of Breast Surgery. Association of Breast Surgery Summary statement on the investigation and management of gynaecomastia in primary & secondary care. [Internet]. 2019 [cited 2022 Aug 28]. Available from: https://associationofbreastsurgery.org.uk/media/65097/abs-summary-statementgynaecomastia-2019.pdf [Crossref]
15. Yazici M, Sahin M, Bolu E, Gok DE, Taslipinar A, Tapan S, et al. Evaluation of breast enlargement in young males and factors associated with gynecomastia and pseudogynecomastia. Ir J Med Sci 2010; 179: 575-583. (PMID: 19495841) [Crossref]
16. Chen L, Chantra PK, Larsen LH, Barton P, Rohitopakarn M, Zhu EQ, et al. Imaging characteristics of malignant lesions of the male breast. Radiographics 2006; 26: 993-1006. (PMID: 16844928) [Crossref]
17. Mieritz MG, Christiansen P, Jensen MB, Joensen UN, Nordkap L, Olesen IA, et al. Gynaecomastia in 786 adult men: Clinical and biochemical findings. Eur J Endocrinol 2017; 176: 555-566. (PMID: 28179453) [Crossref]
18. Cubas V, Chambers S, Zair Z, McEvoy K. Gynaecomastia - Standardising evaluation to facilitate a streamline care pathway. Int J Surg 2018; 55: 15. [Crossref]
19. Rossato M, Sogaro M, Vettor R. Gynecomastia: Pathophysiology, clinical evaluation and management. Journal of Andrological Sciences. 2010; 17: 156-163. [Crossref]
20. Johnson RE, Murad MH. Gynecomastia: Pathophysiology, evaluation, and management. Mayo Clin Proc 2009; 84: 1010-1015. (PMID: 19880691) [Crossref]
21. Cuhaci N, Polat SB, Evranos B, Ersoy R, Cakir B. Gynecomastia: Clinical evaluation and management. Indian J Endocrinol Metab 2014; 18: 150-158. (PMID: 24741509) [Crossref]
22. Kanakis GA, Nordkap L, Bang AK, Calogero AE, Bártfai G, Corona G, et al. EAA clinical practice guidelines-gynecomastia evaluation and management. Andrology 2019; 7: 778-793. (PMID: 31099174) [Crossref]
23. Daniels IR, Layer GT. How should gynaecomastia be managed? ANZ J Surg 2003; 73: 213-236. (PMID: 12662229) [Crossref]
24. Cooper RA, Gunter BA, Ramamurthy L. Mammography in men. Radiology 1994; 191: 651-656. (PMID: 8037795) [Crossref]
25. Beyrouti MI, Beyrouti R, Beyrouti R, Ben Amar M, Affes N, Frikha F, et al. Breast cancer in men. 2007; 36: 1919-1924. (PMID: 17448628) [Crossref]
26. Nuttall FQ. Gynecomastia as a physical finding in normal men. J Clin Endocrinol Metab 1979; 48: 338-340. (PMID: 429488) [Crossref]
27. Lattin GE Jr, Jesinger RA, Mattu R, Glassman LM. From the radiologic pathology archives: diseases of the male breast: radiologic-pathologic correlation. Radiographics 2013; 33: 461-489. (PMID: 23479708) [Crossref]
28. Singh M, Maheshwari B, Khurana N, Jain S. Epidermal inclusion cyst in breast: Is it so rare. J Cytol 2012; 29: 169-172. (PMID: 23112456) [Crossref]

29. Busbaih Z, Almohammed Saleh AA, AlMaghlouth MK, Albeladi AM, Alali T, AlGhadeer MS, et al. Giant Breast Lipoma: A Case Report. Cureus 2022; 14: e22304. (PMID: 35350481) [Crossref]

30. Charlot M, Béatrix O, Chateau F, Dubuisson J, Golfier F, Valette PJ, et al. Pathologies of the male breast. Diagn Interv Imaging 2013; 94: 26-37. (PMID: 23218476) [Crossref]

31. Draghi F, Tarantino CC, Madonia L, Ferrozzi G. Ultrasonography of the male breast. J Ultrasound 2011; 14: 122-129. (PMID: 23397020) [Crossref]

32. Hashmi DL, Ong AW, Muller A, Itzoe ML, Martin A, Foster SM. Breast Hematoma: An Under-Recognized and Under-Reported Female-Specific Traumatic Injury and Its Clinical Significance. Am Surg 2021; 87: 156-158. (PMID: 32902302) [Crossref]

33. Harrison RL, Britton P, Warren R, Bobrow L. Can we be sure about a radiological diagnosis of fat necrosis of the breast? Clin Radiol 2000; 55: 119-123. (PMID: 10657157) [Crossref]

34. Cobo F, Guillot V, Navarro-Marí JM. Breast abscesses caused by anaerobic microorganisms: Clinical and microbiological characteristics. Antibiotics (Basel) 2020; 9: 341. (PMID: 32570867) [Crossref]