

Pictorial Essay: A Retrospective Review of Male Breast Diseases in Maiduguri and Kano, Nigeria

Zainab Mustapha, Maimuna Abdulkalam Haliru¹, Anas Ismail², Sirajo Danhassan Yakubu¹

Department of Radiology, University of Maiduguri, Maiduguri, Borno State, ¹Department of Radiology, Aminu Kano Teaching Hospital, ²Department of Radiology, Bayero University, Kano, Kano State, Nigeria

Correspondence: Dr. Zainab Mustapha, Department of Radiology, University of Maiduguri Teaching Hospital, Maiduguri, Borno State, Nigeria.
E-mail: zayn6624@yahoo.co.uk

ABSTRACT

Introduction: Breast diseases in men are not as common as those in women and though male breast cancer is seen rarely, thus the lack of screening guidelines worldwide, benign breast diseases such as gynecomastia present fairly commonly in both primary and tertiary care setting. There is a paucity of information about the pattern, protocols, and imaging features of male breast diseases in Nigeria. **Objective:** To review the variety of presentations and radiological features of male breast diseases encountered in Aminu Kano Teaching Hospital (AKTH) and University of Maiduguri Teaching Hospital (UMTH). We wish to discuss the departmental protocols and highlight the role of mammography and sonomammography in the evaluation of male breast diseases. **Materials and Methods:** A 5-year retrospective review was performed on the imaging findings of a total number of 27 male patients who presented with symptoms of breast disease to the radiology departments of AKTH (12) and UMTH (15) in Nigeria. All patients had mammography and sonomammography or sonomammography alone performed by a senior radiology resident and consultant radiologist. Selected cases had ultrasound guided biopsy and histology. **Results:** Twenty-seven male patients were reviewed from both centers with an age range of 0.06–69 years (mean of 33.11 ± 18.10 years). The majority of patients (88.9%) presented with breast enlargement only. Concerning laterality of disease, bilateral involvement was more common (59.3%). In unilateral disease, 33.3% of patients presented with left-sided lesions while only 7.4% had right-sided involvement. Gynecomastia was seen in twenty (20) patients and was the most common breast disease seen in male patients presenting for imaging in both centers. Breast abscesses were the second most common. We saw one case of bilateral male breast cancer. Overall, bilateral disease was far more common than unilateral. **Conclusion:** Mammography is the most important first-line imaging modality employed in the diagnosis of male breast diseases in our environment; sonomammography is an important and radiological modality of investigation used to differentiate gynecomastia from male breast cancer and breast abscess. Gynecomastia remains the most common occurring male breast disease in our study.

Key words: Breast; gynecomastia; male; mammography; sonomammography

Introduction

The male breast is anatomically rudimentary and physiologically nonfunctional, with it being identical in size and composed to the female at birth. Both consist of mammary lobes which drain into the nipple via lactiferous ducts,^[1-3] with predominantly subcutaneous fat, fibrous tissue, and sparse subareolar ductal components. The

glandular tissue and Cooper's ligaments seen in the female breast are absent in males,^[1,3,4] and because lobular tissues do not normally develop in male breast, invasive lobular carcinoma is extremely rare.^[2,5]

Although male breast cancers are relatively uncommon, making up <1% of breast cancers,^[3] the male breast is

Access this article online

Quick Response Code:



Website:

www.wajradiology.org

DOI:

10.4103/1115-3474.187969

This is an open access article distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 3.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as the author is credited and the new creations are licensed under the identical terms.

For reprints contact: reprints@medknow.com

How to cite this article: Mustapha Z, Haliru MA, Ismail A, Yakubu SD. Pictorial essay: A retrospective review of male breast diseases in Maiduguri and Kano, Nigeria. *West Afr J Radiol* 2016;23:107-12.

susceptible to a wide range of benign conditions, with many similar to the female breast disease. However, some lesions that are common in the female breast such as fibroadenoma and lobular carcinomas do not occur in males due to the absence of glandular tissues.^[3,6,7] The most common disease of the male breast and cause of male breast enlargement is gynecomastia.^[6]

Mammography is a sensitive and cost-effective examination used for imaging the female breast to detect breast cancer early. In males, mammography is recommended for diagnostic purposes owing to the low incidence of male breast cancer, and hence it is not used as a screening tool.

Mammographically, the male breast is characterized by predominantly fatty radiolucent tissue with retroareolar strand-like densities representing the rudimentary ductal system and fibrous tissue.^[3] Prominent pectoral muscles are a characteristic finding on male mammograms while intramammary lymph nodes are not an uncommon finding. On ultrasound, the normal mammary tissue is seen usually as a small subareolar, triangular hypoechoic structure measuring <1 cm in thickness.^[3,8]

This manuscript reviews the presentations, predisposing factors, imaging protocols, and radiologic features of male breast diseases seen in two Nigerian tertiary hospitals over a period of 5 years.

Materials and Methods

This was a retrospective two-center review of all male patients referred to the Radiology Department of University of Maiduguri Teaching Hospital (UMTH), Maiduguri and Aminu Kano Teaching Hospital (AKTH), Kano.

Departmental protocols

Although there is no standard universal imaging protocol for the evaluation of male breast in contrast to females, AKTH and UMTH have similar departmental protocols in the breast imaging units in place for male patients. All male patients presenting with symptoms of breast disease are subjected to a mammographic and sonomammographic examination. These involved carrying out a diagnostic mammographic and sonomammographic examinations of the affected breast or sonomammographic examination alone. Mammographic examination involved a craniocaudal and mediolateral oblique view of each breast in bilateral and unilateral disease (where possible), a spot compression view of any mass and spot magnification of small masses, and microcalcifications seen on the initial screening views. Furthermore, the size of the breast was considered as a major determinant for the use of mammography in male breast disease due to the ease/convenience of the examination with large-sized breasts.

All examinations were carried out using a GE Senograph DMR mammography machine (GE Healthcare USA) in UMTH and a TUR Mammography Tplus in AKTH (Tur X-Ray Systems, Germany).

Sonomammographic survey was carried out on the breasts and axillae using a 7.5 mHz linear transducer of an ALOKA Prosound ultrasound machine in UMTH and an esoate MyLab40 in AKTH. This examination was performed on all patients independent of the mammographic findings and involved scanning the affected and normal breast (to appreciate subtle changes where present). Systematic sonographic surveys of the thyroid, liver, and testes were also carried out on all male patients as part of our departmental protocol to exclude some causes of gynecomastia such as hyperthyroidism, chronic liver disease, and testicular tumors. Ultrasound-guided biopsies and fine needle aspiration cytology (FNAC) were performed in selected patients using a hand-held BARD® magnum biopsy apparatus and a 14 gauge × 10 cm disposable needles and specimens sent for histopathological evaluation.

Male patients of all ages imaged in the breast units of UMTH and AKTH within the period under review were included in this study. Female Patients were excluded from the study.

Data were collated and analyzed using Statistical Package for the Social Sciences version 16 (SPSS Inc, USA).

Results

The review involved 27 males with age range of 6 months to 69 years (mean of 33.11 ± 18.10 years). The majority of them (88.9%) presented with breast enlargement alone while 11.1% presented with enlargement and pain. Concerning the laterality of the lesion, bilateral involvement consist of 59.3%, left side is 33.3% while the right-sided involvement is 7.4% as shown in Figure 1. Regarding the examination protocol as depicted in Figure 2, most patients (51.6%) have sonomammographic surveys alone while 33.3% had both mammography and sonomammography. Five patients had biopsy and histology (four of which had mammogram and ultrasound whereas one had only ultrasound without mammography).

Table 1 shows the distribution of the disease entities, with gynecomastia occurring predominantly (74.1%). Other disease conditions include mastitis/abscesses, intraductal carcinoma, and lipomastia. It also shows the age distribution of these findings, indicating the mean age of those with gynecomastia at 30.4 years.

Discussion

Although the male breast is susceptible to many similar diseases as the female breast, the incidence of male breast disease is low and majority of men present with benign breast

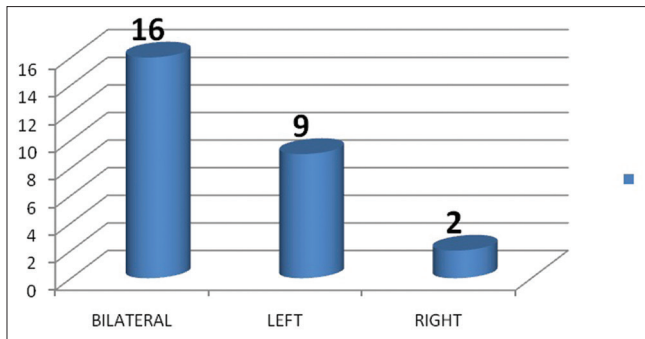


Figure 1: A bar chart showing the side distribution of the male breast disease

Table 1: Age distribution of the imaging/histology findings

Diagnosis	Frequency (%)	Mean age (years)
Gynecomastia	20 (74.1)	30.4
Intraductal carcinoma	1 (3.7)	65.0
Lipomastia	2 (7.4)	44.5
Mastitis/abscess	3 (11.1)	34.0
Normal	1 (3.7)	30
Total	27 (100)	

lesions, with some literature quoting incidence of as high as 80% or more.^[2] Gynecomastia and breast cancer are the two most frequent diseases affecting the male breast. Infections and inflammations of the breast tissue occur quite frequently.^[7] In this review, gynecomastia was the most frequent disease we encountered, followed by mastitis and breast abscess. Our findings are similar to those of earlier studies which all state gynecomastia as the most common occurring male breast disease overall.^[2,3,5,6] Screening and diagnostic mammography are frequently used to image the female breast, but only about 1% or less of mammographic examinations in any mammography center are carried out on the male breasts.^[9]

Gynecomastia (as exemplified by Figures 3 and 4) is a potentially reversible enlargement of the male breast and has numerous causes. Histopathologically, it shows periductal stromal proliferation and hyperplasia of subareolar ducts. The term “gynecomastia” was coined from two greek words “gyne” which means “woman” and “mastos” which stands for “breast.” It is the most common disease of the male breast,^[2,10,11] making up about 80–90% of all cases of male breast disease, with reports of finding palpable breast tissues in up to 90% of newborns in one study and 57% of the male population above 44 years in another.^[7,8,12] Another study which defined gynecomastia as a subareolar nodule size >2 cm found 65% of patients to have gynecomastia; however, none of them were symptomatic.^[13] Gynecomastia can be unilateral or bilateral, physiological, or pathophysiological and is generally caused by benign proliferation of ductal and stromal tissue elements resulting in breast symptoms and imaging findings.^[2] Physiologically, it is seen in neonates,

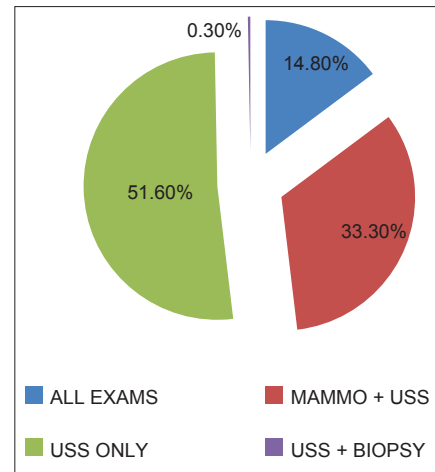


Figure 2: A pie chart, showing the examination protocols of the patients

adolescents, and older men. Breast tissues are identical from birth to puberty in both sexes. In newborns, gynecomastia is believed to occur secondary to transplacental transfer of estrogens and this form of gynecomastia usually regresses within weeks.^[13] At puberty, the levels of estrogen in boys rise, but more importantly and to a greater degree, those of testosterone should also increase and counteract the effect of estrogen during this period of development, and thus the temporary proliferation followed by inhibition of the growth of breast ducts and stromal tissues.^[14] Failure to counteract the effects of estrogens at this age appears to result in an imbalance between estrogens action relative to that of androgens at the level of the breast tissue and results in pubertal gynecomastia.^[11] Thus, gynecomastia seen in these three periods of life (neonatal, pubertal, and senile) is regarded as physiological gynecomastia.^[3] We documented patients within all these 3 periods with our youngest seen at 6 months and the oldest in his 7th decade of life.

Pathophysiologically, gynecomastia has being linked to numerous etiologies including a variety of drugs, systemic and endocrine diseases, and some neoplasm, but the different mechanisms by which it occurs can all be linked to an imbalance between the effects of estrogen and testosterone on the breast tissues.^[11,14] An alteration in the balance between estrogen and free testosterone is affected by serum levels of sex hormone-binding globulins and believed to be the proposed mechanism of gynecomastia in conditions such as hyperthyroidism, chronic liver disease, and medications such as spironolactone.^[11] Primary gonadal failure (as seen in Klinefelter’s syndrome, mumps orchitis, or castration) can also lead to decreased levels of free serum testosterone while elevated levels of serum oestrogen are seen in estrogen-secreting neoplasms or their precursors such as Leydig or Sertoli cell tumors and both these mechanisms are responsible for the imbalance of estrogen and androgen actions on the breast.^[2,10,11] In both classifications, the primary underlying abnormality has been associated with decreased circulating levels of testosterone

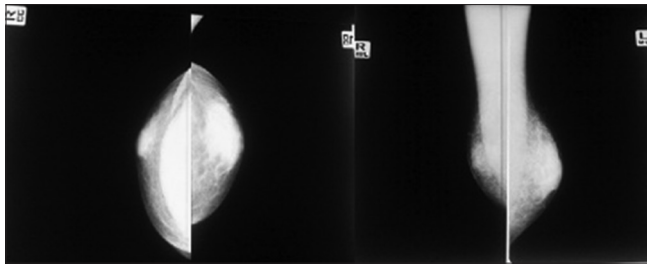


Figure 3: Nodular pattern of gynecomastia showing well-defined fan-shaped retroareolar densities

and raised serum levels of estradiol, respectively, and in postadolescent adult males, medications are responsible for up to 20% of cases with common causative medications including cimetidine, spironolactone, antipsychotic drugs, antiandrogens, anabolic steroids, and some highly active antiretroviral drugs. Puberty remains the most common cause of gynecomastia, affecting up to 60% of young males. Physiological pubertal gynecomastia is usually self-limiting and resolves over a few months to 2 years. Gynecomastia is not considered a precursor of breast cancer in males.^[10,11,15]

Mammography would usually suffice as the primary imaging modality of the breast in cases of gynecomastia.^[8,11] Sonomammography has been employed when mammography is declined or not possible and especially in ruling out the differential diagnosis to this condition and particularly in differentiating gynecomastia and male breast cancer. Ultrasound of the thyroid, liver, and testes are also useful when investigating the many causes of gynecomastia as well as for ultrasound-guided breast biopsies.^[8,16]

Gynecomastia can be mild, moderate, or severe and three radiological patterns have been described. They are nodular, dendritic, and diffuse. Nodular pattern of gynecomastia is seen in the early phase as a well-circumscribed disc-shaped opacity in the subareolar region which if bilateral may be symmetrical or asymmetrical. Sonomammography shows a hypoechoic subareolar mass surrounded by hypo- or hyper-echoic fatty tissues.^[14,16]

The dendritic pattern is seen in the chronic fibrotic phase of the disease, usually a year after onset, believed to be irreversible and is seen as a flame-shaped or spiculated subareolar density with prominent linear extensions radiating into the deeper fatty tissues and is seen sonographically as a wedge-shaped hypoechoic mass centered on the nipple.^[10,14]

The diffuse glandular pattern of gynecomastia is commonly associated with an increased breast size and mammographically and sonomammographically resembles a heterogeneously dense female breast. This form often occurs secondary to exogenous estrogens. A dense nodular parenchymal pattern is seen and coopers ligaments are absent.^[10,14,16]

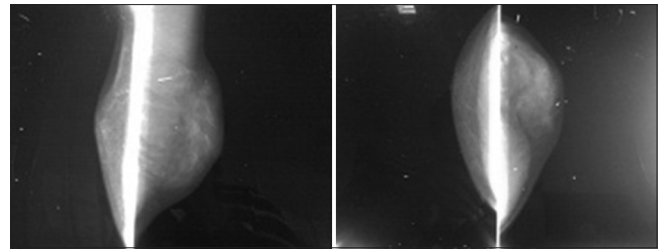


Figure 4: Diffuse unilateral gynecomastia showing absence of Cooper's ligaments

Differential diagnoses of gynecomastia include lipomastia and rarely carcinoma which could present as gynecomastia. Definitive management depends on severity, size, and effect on the patient's well-being and history, and physical examination is key to finding the etiology. Gynecomastia in newborns and at puberty is often physiological and is usually self-limiting, requiring no treatment as it regresses spontaneously and completely. Early withdrawal of the causative agent(s) such as drugs or treating the cause may lead to reversal of early disease. In irreversible cases, reduction mammoplasty may be considered as an option.^[12,17,18]

Medical or surgical treatment is employed when gynecomastia fails to resolve spontaneously and becomes a source of depression for the patient.^[2,17] Medical management ranges from early withdrawal of the causative drugs such as antipsychotic drugs to use of radioactive iodine in hyperparathyroidism. Cosmetic reasons are the most common indications for surgical intervention in the form of reduction mammoplasty or mastectomy in patients in the fibrous or quiescent phase of gynecomastia.^[16,17]

Breast abscess

Breast abscesses are rare in males and often associated with periductal mastitis. They are commonly located in the subareolar or periareolar region and occur secondary to inflammations, chronic ductal obstructions, or duct ectasies. Breast abscess in men could be mistaken as gynecomastia, thus the importance and value of clinical presentation and proper history in differentiation of these two entities and also in ruling out a malignancy.^[2,16] This form of localized infections presents with classical signs of inflammation such as pain, hyperemia, and swelling in early disease. When associated with duct ectasia, they tend to be chronic and may recur unless treated aggressively.^[7]

On mammography (as shown on Figure 5), male mastitis often presents as unilateral disease, associated skin thickening, with or without an underlying abscess. Abscesses often present as an irregular ill-defined mammographic mass in the subareolar region. Calcifications may or may not be seen, but when present may be confused with carcinoma. Sonomammographically, an abscess appears as mixed echogenic mass or as a hypoechoic mass with poorly circumscribed margins in the subareolar region, sometimes with surrounding increased vasculature and

associated skin thickening. Ultrasound is particularly useful in differentiating breast abscess from carcinoma, especially in the presence of calcifications but in a few instances, only biopsy performed under image guidance by a skilled radiologist would suffice to reach a conclusive definitive diagnosis.^[2,7,14,16] Calcifications were not seen in any of the patients reviewed in this study.

We saw two cases of subareolar abscesses with some degree of associated mastitis and 1 case of acute mastitis without evidence of an abscess formation in this series and these patients with acute mastitis were diagnosed in retrospect when they remarkably recovered after a 5-day course of Augmentin 625 mg was given twice daily and showed complete resolution of the initial unilateral breast enlargement a week later. Two of the abscesses were drained successfully and we did not document any case of recurrence as seen by some researchers. In such refractory instances, surgical excision of the abscess and accompanying lactiferous duct is recommended.^[2,16]

Male breast cancer

Male breast cancer is seen rarely, with incidence ranging from 0.17% of all cancers seen in males and 0.7–1% of all breast cancers been diagnosed in men.^[2,7,14] Unfortunately, the worldwide incidence of male breast cancer is increasing and is reported to have increased from 0.85 to 1.3 per 100,000 men in the United States by 2000 to as high as 2–9% in some parts of Africa.^[9] It is substantially less common than gynecomastia, occurs in elderly patients, and shows a peak incidence at 71 years.

Some risk factors for male breast cancer are similar to those of females, such as advancing age, BRCA1 or BRCA2 gene mutation and family history; however a few differ such as Klinefelter syndrome, testicular injury and cryptorchidism and these are in fact unique to males.^[2,7,14,16] Unlike female breast cancer, where only 5% or less is attributed to genetic mutation, incidences of 4–40% of male breast cancer are linked to BRCA2 gene mutation and >0–11% carrying BRCA1 gene in others.^[14,18]

Invasive ductal carcinoma is the most common histological subtype of male breast cancer, accounting for almost

80–90% of cases. Other forms seen are ductal carcinoma *in situ* and papillary carcinoma. Lobular carcinoma is not seen in normal males due to the lack development of lobular tissues, with the exception of patients Klinefelter syndrome (XXY), in whom this form of breast cancer is the majority.^[2,7,10,11,14] The diagnosis is often made clinically as 80–90% of patients present with a painless palpable subareolar breast mass which is often indurated in more than 75% of patients.^[10,14,18] Invariably, all the other presenting features such as axillary lymphadenopathy, nipple discharge or retraction, and skin thickening are similar to those of female breast cancer, with axillary lymphadenopathy present in 50% at presentation.^[2,7,10,14,18] Radiologic survey using mammography and sonomammography which would usually suffice to reach the diagnosis of breast cancer in male patients and histological diagnosis is also always essential. Magnetic resonance imaging is not commonly used in imaging the male breast. Mammography is often the imaging used when male breast cancer presents as a subareolar eccentric mass, very often as a spiculated mass with an indistinct or microlobulated margins. Less often, it may present as a circumscribed, well-defined, ill-defined, spiculated, round, oval, irregular, or frequently lobulated mass and rarely may be mammographically occult. Axillary nodal metastasis is present in about 50% of patients at presentation.^[2,7] Calcifications may or may not be associated with a breast mass. They are often rarer and coarser than those seen in female breast cancer and it is important to note that the calcifications seen in male breast cancer are not typical of those seen in female breast cancer; on the contrary, they often appear benign looking, such as nodular calcifications.^[14,16,19] As with female breast imaging, all male breast masses are spot compressed or spot magnified if small while all microcalcifications are spot magnified as these additional mammographic views help better visualize and thus describe the mass margins and or microcalcifications. Sonomammography is the additional imaging and recommended adjunct to mammography and show round or irregular, indistinct mass, often hypoechoic but sometimes isoechoic located in the subareolar region and very often in the lower outer quadrant. Posterior acoustic shadowing and architectural distortion are common finding too [Figure 6]. Secondary signs of malignancy such as nipple retraction, skin thickening, and axillary lymphadenopathy are often present.^[18,19] The prognosis of male breast cancer is similar to that of female and based on the histological subtypes but seen to be slightly worse in general as many patients present late and often with distal metastasis by presentation.

Biopsies are performed for all cases of suspected malignancy, with or without an initial FNAC being performed. Most patients with histologically proven male breast cancer in UMTH were seen in advanced disease were neither mammography nor sonomammography was possible. Only one case of male breast cancer was referred to one of our departments for imaging in the period under review. This 65-year-old man had bilateral subareolar breast masses, axillary lymphadenopathy, and

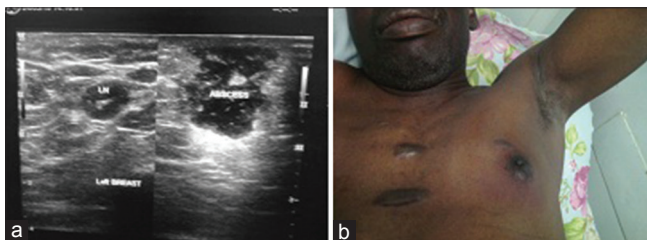


Figure 5: Breast abscess in a 45-year-old male; (a) sonogram demonstrating irregular anechoic retroareolar lesion with an adjacent reactive lymphadenopathy and (b) showing left breast with obvious erythema and induration

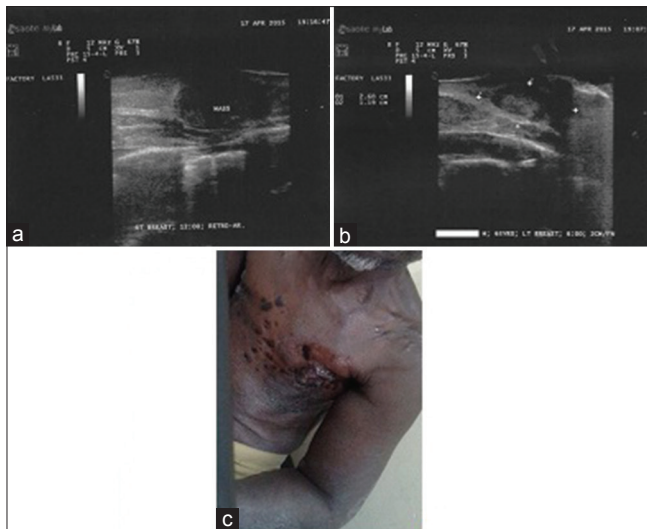


Figure 6: Male breast cancer - (a and b) are sonograms of both breasts showing hypoechoic retro-areolar masses infiltrating the underlying muscle; (c) picture of patient showing ulcerated left breast, cutaneous nodules and lymphedema of left arm

lymphedema of the entire left upper limb. Histology showed invasive ductal carcinoma bilaterally.

We did not document any other form of benign disease in these patients such as lipomas, epidermal inclusion cyst, or fibrocystic change. This could be attributed to the documented rarity of these conditions.

Conclusion

Male breast diseases are increasingly been encountered in our tertiary hospitals. Mammography is the most important first-line imaging modality recommended for imaging the male breast. Sonomammography, a reliable adjunct, and mammography should be used where available and possible especially in differentiating gynecomastia from breast cancer. Gynecomastia remains the most common occurring male breast disease in our study. Male breast cancer is rare.

Recommendation

It is hoped that this research will assist surgeons and radiologists with the differential diagnosis and imaging protocols of this increasing group of patients, thereby enabling them to provide better care while adding to the wealth of knowledge available on male breast disease from Nigeria.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

References

- Moore KL. Clinical Oriented Anatomy. 4th ed. Philadelphia, USA: Wolters Kluwer, Lippincott Williams and Wilkins; 1999.
- 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;33:763-79.
- Carrasco RM, Benito MA, Del Campo ER, Cordoba ES, Villejuiif FR. Pictorial Review: Imaging Findings of Male Breast Lesions. Educational Exhibit. ECR; 2013.
- Ryan S, McNicholas M, Eustace S. The breast. In: *Anatomy for Diagnostic Imaging*. 3rd ed. Philadelphia, USA: Saunders Elsevier; 2011. p. 313-23.
- Popli MB, Popli V, Bahl P, Solanki Y. Pictorial essay: Mammography of the male breast. *Indian J Radiol Imaging* 2009;19:278-81.
- Lattin GE Jr., Jesinger RA, Mattu R, Glassman LM. From the radiologic pathology archives: Diseases of the male breast: Radiologic-pathologic correlation. *Radiographics* 2013;33:461-89.
- Appelbaum AH, Evans GF, Levy KR, Amirkhan RH, Schumpert TD. Mammographic appearances of male breast disease. *Radiographics* 1999;19:559-68.
- Dialani V, Baum J, Mehta TS. Sonographic features of gynecomastia. *J Ultrasound Med* 2010;29:539-47.
- Mustapha Z, Minoza K, Okedayo M, Ali AA, Nggada HA, Kyari M. An appraisal of male mammography in Maiduguri, North Eastern Nigeria. *Borno Med J* 2014;11:129-33.
- Berg WA, Yang WT. Special topics-gynecomastia. In: *Diagnostic Imaging: Breast*. 2nd ed. Salt Lake City, UT 84106, Salt Lake City, Utah: Amirsys; 2014. p. 98-103.
- Stavros AT. Evaluation of the male breast. In: *Breast Ultrasound*. 1st ed. Philadelphia, USA: Lippincott Williams & Wilkins; 2004. p. 733.
- Dickson G. Gynecomastia. *Am Fam Physician* 2012;85:716-22. Available from: <http://www.aafp.org/afp>. [Last accessed on 2012 Apr 01].
- McKiernan JF, Hull D. Breast development in the newborn. *Arch Dis Child* 1981;56:525-9.
- 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.
- Mahmood S, Sabih Z, Sabih D. Lymphoma presenting as gynecomastia. *Biomed Imaging Interv J* 2011;7:e10.
- Iuanow E, Kettler M, Slanetz PJ. Spectrum of disease in the male breast. *AJR Am J Roentgenol* 2011;196:W247-59.
- Johnson RE, Murad MH. Gynecomastia: Pathophysiology, evaluation, and management. *Mayo Clin Proc* 2009;84:1010-5.
- Fischer U, Baum F, Luftner-Nagel S. Benign changes. In: *Breast Imaging – Direct Diagnosis in Radiology*. 1st ed. Stuttgart, Germany: Thieme; 2007. p. 136-8.
- Chu KM, Chiu LF, Fung HS, Kwok KY, Wai AM, Siu JC, *et al.* An institutional audit and pictorial review of common male breast diseases. *Hong Kong J Radiol* 2011;14:15-23.