

THE MAMMOGRAPHIC AND SONOGRAPHIC FEATURES OF MALE BREAST DISEASES AT KING HUSSEIN MEDICAL CENTRE

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ABSTRACT

Objectives: To describe the mammographic and sonographic features of male breast diseases, and to correlate the radiological, cytological and histopathological diagnoses.

Methods: This is a retrospective descriptive study that was conducted at King Hussein Medical Centre, Amman, Jordan between January 1st 2004 and December 31st 2007. The mammograms and breast ultrasounds of 88 symptomatic male patients were reviewed and analyzed. A total of 24 patients with unilateral breast masses underwent fine-needle aspiration, eight of them with suspected malignant lesions underwent further true cut biopsy and surgery. The radiological, cytological and histopathological diagnoses were correlated.

Results: Sixty one (70%) patients had gynaecomastia, 15 (17%) had fatty breasts (pseudo-gynaecomastia), eight (9%) had primary breast carcinoma, two (2%) had lipomas, one (1%) had abscess, and one (1%) had hematoma. The characteristic radiological features were confirmed by fine-needle aspiration cytology in 16 patients and by both cytology and histopathology studies in eight cases.

Conclusion: Radiological findings provide characteristic diagnostic appearances for certain important male breast diseases. The radiological features can be accurately correlated with pathological diagnosis.

Key words: Male Breast, Mammography, Sonography

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Introduction

Breast disorders in males can be distressing and patients often feel embarrassed and anxious.⁽¹⁾ In our community a male patient with breast enlargement or mass will be very reluctant to seek medical advice as this might be considered a social stigma and a sign of incomplete masculinity. Gynaecomastia and breast cancer are the two most common diseases of the male breast. Other breast diseases arise from the skin and subcutaneous tissues as fat necrosis and lipoma.⁽²⁾ Male breast cancer is rare being 1% of all breast tumors, and frequently associated with gynaecomastia.⁽³⁾ Delay

in diagnosis can result from ignorance of the existence of breast cancer in males, and this may adversely affect prognosis. In evaluating the clinically abnormal male breast, mammography and ultrasound are essential, and should be performed along with the physical clinical examination.⁽²⁾ The aim of this study is to describe the radiological features of male breast diseases at King Hussein Medical Centre, and to correlate the radiological, cytological and histopathological diagnoses.

Methods

This is a retrospective descriptive study that was

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Table I. The distribution of mammographic patterns in Gynaecomastia

Gynaecomastia	Patients No (%)	Dendritic	Diffuse	Nodular
Bilateral	34 (56%)	22 (36%)	8 (13%)	4 (6%)
Unilateral	27 (44%)	15(25%)	5 (8%)	7 (11%)

Table II. Symptoms of male patients presented with Gynaecomastia

Clinical Presentation	Total patients No 61 (100%)
Palpable mass	24 (40%)
Pain and tenderness	16 (26%)
Diffuse breast enlargement	13 (21%)
Swelling and tenderness	8 (13%)

conducted at King Hussein Medical Centre, a tertiary referral hospital, Amman, Jordan from January 1st 2004 to December 31st 2007. Eighty-eight male patients referred to the Radiology department with breast complaints were reviewed in this study. Breast complaints included swelling, palpable masses, pain, and tenderness. All patients were examined by both mammography and breast ultrasound (BUS). Mammographic mediolateral oblique (MLO) and craniocaudal views were obtained for each breast using Siemens Mammomat 2 Mammography Unit. Mammograms were reviewed for the presence of gynaecomastia, masses, calcifications, lymph node enlargements, and nipple and skin changes. BUS was performed using 5-11 MHz linear transducer, ATL Philips HDI 5000 Ultrasound was done to evaluate the site, shape, outline, and echogenicity of any mass, and to observe the presence of enlarged axillary lymph nodes. Fine-needle aspiration (FNA) was collected from 24 patients presenting with unilateral breast masses, and the cytology findings were recorded. Eight patients with suspected malignant lesions underwent further true cut biopsy and surgery. The radiological appearances were described and correlated with the pathological diagnoses.

Results

A total of 88 symptomatic male patients were investigated. The age of the patients ranged between 25-80 years with a mean of 53 years, 61 (70%) patients had gynaecomastia, 15 (17%) had fatty breasts (pseudo-gynaecomastia), eight (9%) had primary breast carcinoma, two (2%) had lipomas, one (1%) had abscess, and one (1%) had hematoma. The final diagnosis was based primarily on typical radiological findings in 64 patients. However, radiological features were confirmed by FNA cytological diagnosis in 24 patients: 14 with

gynaecomastia, eight with breast cancer, one with breast abscess, and one with breast hematoma.

Gynaecomastia was diagnosed by mammography in 61 (70%) patients when there was increased retroareolar density extending from the areola in a flame-shaped (dendritic) (Fig. 1), nodular or diffuse pattern. Gynaecomastia was bilateral in 34 (56%) patients and unilateral in 27 (44%), and the distribution of mammographic patterns of gynaecomastia is shown in Table I. The age of patients with gynaecomastia ranged between 25-70 years. The clinical presentations of patients with gynaecomastia (Table II) included palpable mass in 24 (40%) patients, pain and tenderness in 16 (26%), diffuse breast enlargement in 13 (21%), and swelling and tenderness in eight (13%). Out of 61 patients with gynaecomastia, 14 underwent FNA, seven were on spironolactone diuretic therapy, two on oestrogen therapy for prostate cancer, and one had testicular carcinoma.

A total of 15 (17%) patients had fatty breasts (pseudo-gynaecomastia) demonstrated by mammography as adipose tissue without retroareolar density or ductal structures (Fig. 2). Those patients had no history of drug intake or other medical illnesses; however 4 had recent increase in body weight.

Eight (9%) patients, who presented with a painless breast mass, had radiological features consistent with primary breast carcinoma, and the diagnoses were confirmed by FNA cytological findings. Furthermore these eight patients underwent true cut biopsy and surgery, and the diagnoses were confirmed by histopathological studies. They were also followed up on annual basis. The mean age of breast cancer patients was 68 years. Mammography revealed central retroareolar masses with irregular ill-defined margins (Fig. 3). There were no microcalcifications detected in seven patients,

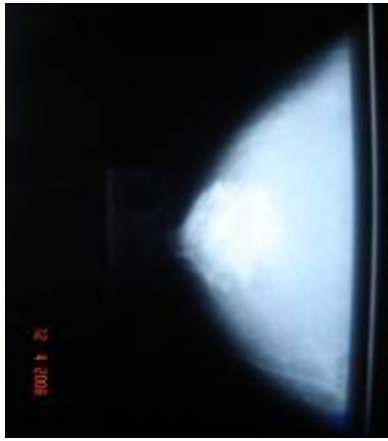


Fig. 1. Craniocaudal mammogram view of right male breast showing dendritic gynaecomastia



Fig. 2. MLO mammogram view of left male breast showing fatty breast (pseudogynaecomastia)

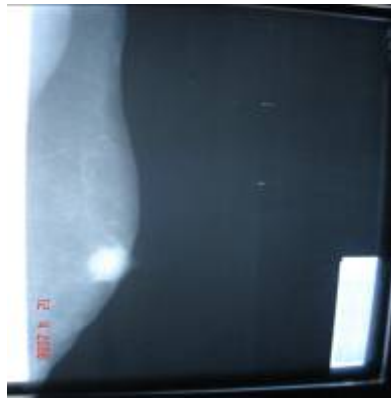


Fig. 3. MLO mammogram view of left male breast showing breast cancer

however diffuse microcalcifications were shown in one patient. BUS showed an irregularly-outlined hypoechoic retroareolar mass with posterior acoustic shadowing in five patients, and a well-circumscribed smooth retroareolar mass in three. One mass had prominent microcalcifications seen as bright echoes. Histological examination revealed invasive ductal carcinoma in six patients, invasive ductal carcinoma with ductal carcinoma in situ (DCIS) in one, and an isolated poorly differentiated DCIS in one patient.

BUS of two patients, who presented with palpable mass, revealed hyperechoic lesions consistent with lipomas; however the mammogram showed a thin radio-opaque capsule of the lipoma in one patient, whereas no abnormality was detected in the other.

The mammogram of a 70-year-old patient, who presented with a subareolar tender swelling, revealed a lobulated mass with indistinct borders, and BUS showed an irregular inhomogeneous mass with posterior acoustic shadowing. These radiological features were consistent with subareolar breast abscess and the diagnosis was confirmed by FNA cytological findings.

The mammogram of a 45-year-old patient, who presented with a palpable mass, revealed a well-circumscribed mass; however BUS showed that the mass had heterogeneous echogenicity with posterior acoustic enhancement. FNA cytological findings of this lesion confirmed the diagnosis of hematoma.

Discussion

The normal male breast consists predominantly of fat, and contains few secretory ducts. On mammography, it is homogeneously radiolucent with few strands of ductal or interlobular connective tissue, without suspensory ligaments of Cooper.⁽⁴⁾ Breast enlargement that results from increase in fat as in obesity is called pseudo-gynaecomastia or fatty breast. This is easily differentiated from gynaecomastia by mammography that demonstrates adipose tissue only without retroareolar density or ductal structures.

Gynaecomastia is the benign enlargement of ductal and stromal components of male breast tissue, resulting from a relative increase in oestrogen effect which stimulates duct development, or decrease in

androgen effect which antagonizes the effect of oestrogen.⁽¹⁾

Physiological gynaecomastia occurs in three distinct groups: neonatal, pubertal, and adult males between the ages of 50-80. Overall, 65-90% of all male neonates have breast tissue, resulting from the transfer of maternal and placental oestrogen and progesterone, which persists up to several months.^(1,5) At puberty, by the age of 14, up to 60% of boys have gynaecomastia, secondary to imbalance in the normal androgen-oestrogen ratio. This usually resolves within 1-2 years. Gynaecomastia is found in 32-65% of healthy men at all ages. In elderly men, gynaecomastia may be secondary to decreased testosterone production due to testicular insufficiency.^(1,6,7)

Non-physiological gynaecomastia develops with a variety of syndromes, drugs, and diseases. Gynaecomastia is associated with the recovery stage of starvation, ambiguous genitalia, and Klinefelter's syndrome. Diseases associated with gynaecomastia include hyperthyroidism, renal disease and hemodialysis, liver cirrhosis, and primary and secondary hypogonadism. Neoplasms producing oestrogen such as testicular Leyding cell, sertoli cell, testicular germ cell, and adrenal tumors are also associated with gynaecomastia. Drugs associated with the development of gynaecomastia can be divided into non-hormonal drugs like cimetidine, digoxin, diuretics, phenytoin and tricyclic antidepressants, and hormonal drugs like androgens, estrogens and estrogen agonists, choriogonadotropins, and anti androgens.^(1,5,8)

In this study, seven patients with gynaecomastia were on spironolactone diuretic therapy, two on estrogen therapy for prostate cancer, and one had testicular carcinoma.

Clinically, gynaecomastia may be detected as a palpable subareolar mass, usually bilateral and sometimes painful, however it might be unilateral.⁽²⁾ Three mammographic patterns of gynaecomastia have been described. Nodular pattern appears as a fan shaped density radiating from the nipple, and might appear spherical.^(5,9) Dendritic gynaecomastia appears as a retroareolar soft tissue density with prominent extension that radiates into the deeper adipose tissue. Diffuse gynaecomastia has mammographic appearances similar to a heterogeneously dense female breast.^(9,10) Cooper and coworkers⁽⁵⁾ reviewed mammograms of 263 male patients and detected gynaecomastia in 213 (81%) patients, where 103 (48%) had nodular

pattern, 82 (38%) dendritic, and 28 (13%) diffuse. In another study,⁽²⁾ mammograms of 236 male patients were reviewed and detected gynaecomastia in 206 (87%) patients, where 72 (35%) had dendritic pattern, 70 (34%) nodular, and 64 (31%) diffuse. In our study, gynaecomastia was detected in 61 (70%) patients, where 37 (61%) had dendritic pattern, 13 (21%) diffuse, and 11 (18%) nodular.

Sonography is useful in evaluating gynaecomastia, and detecting cancers obscured by the dense breast tissue.⁽²⁾ Ultrasound was recommended by Daniels and Layer⁽¹¹⁾ as the first line imaging of gynaecomastia, and mammography may be added to confirm the diagnosis.

Male breast cancer is less common than gynaecomastia, and accounts for 0.5-1.0% of all breast cancers, and 0.17% of all male carcinomas.⁽¹²⁾ It occurs at any age, but the mean age is 65 years. Gynaecomastia is not a risk factor for cancer, but both can co-exist together in high estrogen status, as in men with Klinefelter's syndrome who have 58 folds high risk to develop breast cancer.⁽¹²⁻¹⁴⁾ A family history of breast cancer increases the risk of developing cancer in males, and this may be linked to mutation in the BRCA2 (Breast Cancer Type 2 susceptibility protein) gene. Ashkenazi Jews have a higher prevalence of BRCA1 (Breast Cancer Type 1 susceptibility protein) and BRCA2 genes, and an increased risk of breast cancer than other populations.^(1,12,15) In our study, the wife of one of the breast cancer patients was his second degree relative and had breast cancer for four years. There was an increased risk of developing breast cancer in patients with prostate cancer receiving estrogen therapy.⁽¹⁶⁾ Exposure to radiation, obesity, and alcohol consumption are other suggested risk factors for male breast cancer.^(8,12,15)

As with women, the most common symptom of male breast cancer is a painless lump, and other symptoms include pain, bloody nipple discharge, nipple retraction, and skin thickening. Breast tissue in women is largely in the upper outer quadrant; however it is subareolar in men. That is why the tumor site for breast cancer in men is usually subareolar.⁽²⁾ Out of 87 cases reviewed by Yap *et al.*⁽¹⁶⁾ 77 (88%) were subareolar with nipple involvement. A similar prevalence of subareolar tumor was seen in the series of Dershaw *et al.*⁽¹³⁾ The margins of the lesion may be well defined, ill defined, or spiculated. The lesion may be rounded, oval or irregular, and might contain numerous tiny calcifications. In our study, all eight breast tumors

were subareolar, diffuse microcalcifications were seen only in one patient, and there was no breast cancer detected in any patient with gynaecomastia.

BUS helps in the correct local staging of the tumor, by identifying the degree of infiltration of the skin and pectoral muscle.⁽¹⁷⁾ Yang *et al.* in their study on the sonographic features of eight male breast carcinomas, reported a complex cystic mass in four cases.⁽¹⁷⁾

Approximately 85% of breast cancers in men are infiltrating ductal carcinoma. DCIS associated with infiltrating ductal carcinoma was found in 35-50% of male breast cancers. Pure DCIS without associated infiltrating ductal carcinoma is a rare disease, representing approximately 5% of all male breast cancers.^(18,19) Lobular carcinoma has been reported in only a few cases.⁽²⁰⁾ In our study, invasive ductal carcinoma was diagnosed in six patients, infiltrating ductal carcinoma with DCIS in one, and an isolated poorly differentiated DCIS in one. However lobular carcinoma was not detected.

On mammography, a lipoma can be shown as a circumscribed radio-lucent lesion with a thin opaque capsule. In our study, lipoma was detected in two patients, seen on BUS as a well defined hyperechoic mass; however only one showed the thin radio-opaque capsule on mammography.

Subareolar abscess is a chronic lesion associated with duct ectasia, which tends to recur, unless treated by excision of both the abscess and the duct.⁽²⁾ Appelbaum *et al.*⁽²¹⁾ described two cases of breast abscess, as a nodule with indistinct borders, and punctate calcifications. There was one case of diagnosed breast abscess in our study.

Other uncommon male breast diseases such as tuberculosis, neurofibroma, intracystic papilloma, subcutaneous leiomyoma, and adenomyoepithelioma were not detected in our study.

Conclusion

The male breast is rudimentary, and physiologically non functional, however it may be involved in many pathological conditions. Mammography and ultrasound are essential in evaluating suspected male breast disease following clinical examination.

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