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Male Breast Cancer: A Single Center Case Series

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Introduction: Male breast cancer is a rare malignancy, and despite increasing its prevalence, little is known about its prognosis, and management continues to rely largely on guidelines developed for female breast cancer. This study presents a single-center experience focusing on the diagnosis, therapeutic strategies, and prognostic outcomes associated with male breast cancer.

Methods: The study was carried out between May 2020 and January 2025. All the male patients diagnosed with breast cancer were identified from the center's database. The study included those with complete medical records, encompassing demographics, clinical presentation, imaging findings, outcome, and follow-up data.

Results: Fifteen male breast cancer cases were analyzed (mean age 59.47 ± 12.97 years). The left breast was affected in 60%, and 80% presented with a painless lump. Tumor size ranged 0.6–5.4 cm (mean 2.53 ± 1.50 cm). Modified radical mastectomy was performed in 86.66%. Invasive ductal carcinoma predominated (93.33%), with lymph node involvement in 40% and bone metastasis in 6.67%. Immunohistochemistry results were available for 5 patients (33.33%); all of them were estrogen receptor and progesterone receptor positive and human epidermal growth factor receptor 2 negative. Adjuvant chemotherapy and radiotherapy were used in 33.33%, while 20% received triple modality therapy. Mean follow-up was 2.8 ± 1.52 years (range 1–5), with one recurrence.

Conclusion: Male breast cancer may present as a breast mass and is often diagnosed as invasive ductal carcinoma. Modified radical mastectomy accompanied by adjuvant therapy might offer favorable outcomes.

Keywords: Male breast cancer, invasive ductal carcinoma, mastectomy, wide local excision, chemotherapy

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1. Introduction

Male breast cancer (MBC) is a rare condition, representing about 1% of all malignancies in men and of all breast cancer cases globally. Moreover, MBC accounts for less than 0.2% of cancer-related mortality among men. Breast cancer occurs less frequently in males, with a male-to-female ratio of approximately 1:100. This lower incidence is primarily attributed to the limited amount of breast tissue and differences in hormonal profiles between men and women [1-3]. Data from the Surveillance, Epidemiology, and End Results (SEER) program show an increase in male breast cancer incidence from 1.0 per 100,000 in the late 1970s to 1.2 per 100,000 in 2000–2004, with a median age at diagnosis of 67 years [2,4]. Like female patients, certain germline mutations increase the risk of breast and other cancers in men. Approximately 15% to 20% of men with breast cancer report a family history of breast or ovarian cancer, and around 10% carry a known hereditary mutation associated with breast cancer predisposition. BRCA2 is the gene most strongly associated with MBC, with affected individuals facing a lifetime risk ranging from 1% to 6%, higher than the approximate 0.1% risk in the general male population [4]. Additional genetic risk factors may contribute to the development of MBC, such as alterations in the ratio of estrogen to testosterone, as seen in individuals with Klinefelter syndrome [5]. Management of MBC is largely adapted from treatment protocols established for female breast cancer (FBC), owing to the limited availability of prospective, male-specific clinical trials. Notably, male patients represented only 0.087% of participants across 131 breast cancer clinical trials [6]. The current study presents a single-center experience regarding the diagnosis, management, and prognosis of MBC patients. All the references have been evaluated, and non-peer-reviewed sources have been excluded [7].

2. Methods

2.1. Study Design and Setting

This study was a single-center case series carried out at the Breast

Clinic of Smart Health Tower between May 2020 and January 2025. This study was approved by the Ethics Committee of Kscien organization (Approval No. 2025-36).

2.2. Participants and Eligibility Criteria

The study included patients with a confirmed histopathological diagnosis of MBC who had complete medical records and provided consent for the publication of their data.

2.3. Data Collection

Data were retrieved from the hospital's registry. The parameters included demographic details, clinical presentation, diagnostic findings, management, outcome, and follow-up.

2.4. Intervention

The patients underwent surgery under general anesthesia in the supine position, following skin preparation and antiseptic measures. The surgical approach was tailored to the specific requirements of each case, utilizing elliptical, Stewart, or alternative incision techniques as appropriate. After the incisions, procedures such as wide local excision, modified radical mastectomy (MRM), or nipple-areolar sparing mastectomy were performed. In all cases, the long thoracic and thoracodorsal nerves were preserved. Lymph node management involved either sampling or dissection of levels I, II, and III. Hemostasis was secured, and a Redivac drain was placed for each patient. Finally, the surgical site was closed in anatomical layers. For histopathology, 5-µm-thick tissue sections were fixed in 10% neutral buffered formalin at room temperature for 24 hours and subsequently embedded in paraffin. The slides were prepared and stained with hematoxylin and eosin (Bio Optica Co.) for 1–2 minutes at room temperature, then examined using a light microscope (Leica Microsystems GmbH).

2.5. Data Processing and Statistical Analysis

All collected data were recorded and organized using Microsoft Excel 2021. Statistical analysis was performed using the Statistical Package for Social Sciences (SPSS), version 25.0. Descriptive statistics were applied to summarize the results. Continuous variables were reported as means with standard deviations or medians with interquartile ranges, while categorical variables were presented as frequencies and percentages.

Table 1. Demographic data and patient history.

Variables	Frequency (%)
Age	
40-49	2 (13.33%)
50-59	8 (53.33%)
60-69	2 (13.33%)
>70	3 (20.00%)
Mean ± SD	59.47 ± 12.97
Occupations	
Manual labor	15 (100%)
Smoking status	
Active smoker	1 (6.67%)
Passive smoker	1 (6.67%)
Non-smoker	13 (86.66%)
Medical history	
Breast cancer	1 (6.67%)
Hypertension	2 (13.33%)
Hypertension & diabetes mellitus	1 (6.67%)
Negative	11 (73.33%)
Surgical history	
Mastectomy	1 (6.67%)
Herniotomy	2 (13.33%)
PNS surgery	1 (6.67%)
Hemorrhoidectomy	1 (6.67%)
Laparoscopic cholecystectomy & eye surgery	1 (6.67%)
Negative	9 (60.00%)
Family history of breast cancer	
Positive	1 (6.67%)
Negative	14 (93.33%)

SD: *standard deviation,* ***PNS:*** *pilonidal sinus*

3. Results

3.1. Patient Demography

A total of 15 MBC cases were diagnosed and managed during the period of conducting the study. Ages ranged from 40 to 85 years (59.47 ± 12.97). All participants were manual workers. 1 patient (6.67%) was an active smoker, 1 (6.67%) was a passive smoker, and none reported alcohol consumption. The history of breast cancer was positive in 1 patient (6.67%) who had undergone mastectomy (Table 1).

3.2. Clinical Presentation and Diagnosis

The left side was involved in 9 patients (60%), while the right side was affected in 6 patients (40%). Clinical presentations included a painless breast lump in 12 patients (80%) and an axillary lump, breast discharge, and breast pain in each of the remaining patients (6.67%). Gynecomastia was present in 2 cases (13.33%). The duration of symptoms ranged from one week to two years, with a median of 0.69 (5.77) months. On ultrasonography, tumor sizes ranged from 0.6 cm to 5.4 cm, with a mean size of 2.53 ± 1.50 cm. Tumors were located centrally in 10 patients (66.66%), in the upper outer quadrant in 3 patients (20%), and in the upper inner quadrant and axilla each in 1 patient (6.67%) (Table 2). Mammography was performed for 5 patients (33.33%), all of whom had microcalcifications with variations in margin appearance (Figure 1). Computed tomography revealed lymphadenopathy in 5 (33.33%) patients (Figure 2).

Table 2. Clinical Findings of Male Breast Cancer patients

Variable	Frequency (%)
Affected side	
Right	6 (40.00%)
Left	9 (60.00%)
Clinical presentation	
Painless breast lump	12 (80.00%)
Axillary lump	1 (6.67%)
Breast discharge	1 (6.67%)
Breast pain	1 (6.67%)

Table 2. Continued…	
Presence of gynecomastia	
Yes	2 (13.33%)
No	13 (86.67%)
Duration of symptoms, months (median (IQR))	0.69 (5.77)
Tumor size (cm), mean ± SD	2.53 ± 1.50
Tumor location	
Central	10 (66.66%)
Upper outer quadrant	3 (20.00%)
Upper inner quadrant	1 (6.67%)
Axilla	1 (6.67%)

IQR: *Interquartile range,* ***cm:*** *Centimeter,* ***SD:*** *Standard deviation*

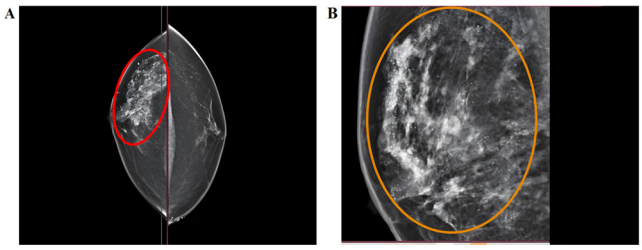

Figure 1. A) CC-view mammogram of a male breast showing regional asymmetry in the outer part of the right breast with microcalcifications (red circle). **B)** True lateral magnification compression view of the right breast in a male patient, demonstrating malignant-type ductal calcifications (orange circle).

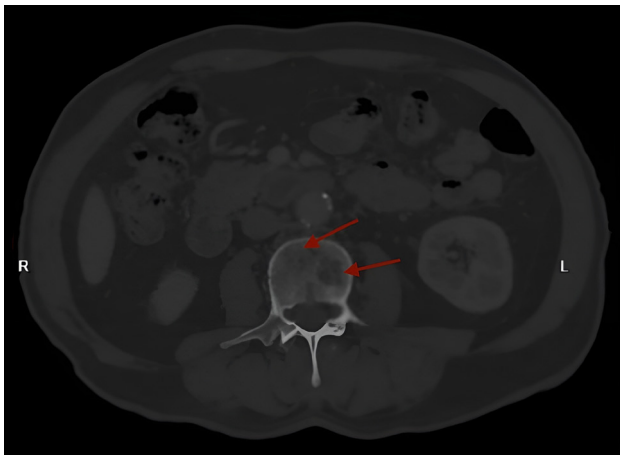

Figure 2. Single axial CT scan in the bone window setting showing an osteolytic lesion within the vertebral body, suggestive of metastatic involvement from breast cancer (red arrows).

3.3. Management and Outcome

Thirteen patients (86.66%) underwent MRM. Of these, 6 patients (40%) had MRM with axillary sampling only, while 7 patients (46.66%) underwent MRM combined with axillary lymph node dissection (ALND) at different levels (5 cases with ALND levels I and II, one with ALND levels I, II, and III, and one with ALND level I). One case (6.67%) underwent bilateral nipple-areola sparing mastectomy with radiotherapy and axillary sampling. Additionally, wide local excision with axillary sampling was performed in one patient (6.67%) (Figures 3-5). Histopathology confirmed invasive ductal carcinoma (IDC) in 14 cases (93.33%), either in isolation or in association with other pathological findings (Figure 6). Seven patients (46.67%) had grade II tumors, while six patients (40.0%) had grade III tumors. Regarding lymph node status, 9 patients (60.0%) had no evidence of lymph node involvement, whereas 6 patients (40.0%) showed varying degrees of lymphatic spread. Bone metastasis was recorded in one patient (6.67%). Immunohistochemistry results were available for 5 patients (33.33%); all of them were estrogen receptor and progesterone receptor positive and HER2 negative. Ki-67 proliferation index was reported in 3 patients (20%), with values ranging from 40% to 41%. The most used adjuvant therapy included a combination of chemotherapy and radiotherapy in 5 cases (33.33%), and a combination of chemotherapy, radiotherapy, and hormonal treatment in 3 cases (20%). The follow-up period ranged from 1 to 5 years (2.8 ± 1.52 years), and only one case of recurrence was reported (Table 3).

4. Discussion

Breast cancer in males accounts for <1% of all cancers and <1% of breast cancers, with higher incidence in North America and Israel, lowest in Thailand, and the highest European rates reported in Italy [8]. The mean age of diagnosis in this study was comparable to that reported in the literature [2,4]. Smoking and alcohol consumption were infrequent among the MBC patients. It has been suggested that alcohol consumption is not associated with an increased risk of MBC, while the role of smoking as a potential risk factor remains controversial [8]. However, a study of 53 MBCs by Herrero et al. observed that 77% of the patients were ex-smokers and 17% had a history of alcoholism [9]. Only one patient in the current series reported smoking.

In the current study, 6.67% of the patients reported a family history of breast cancer. Soliman and Hetnał reported that 7.7% of the patients had a positive family history of breast cancer, while Herrero et al. found that 23% of the patients had a family history of breast or ovarian cancer [9,10]. A study involving 152 MBCs and 304 FBC patients from 1990 to 2014 revealed that a positive family history was significantly more common in MBC cases compared to FBC (30.9% vs. 18.4%) [11].

Gynecomastia is a common condition present in 30–50% of healthy men. Although gynecomastia is not considered a usual risk factor, the issue is still controversial. Gynecomastia has been reported in 6–30% of MBC cases [12]. Two of the patients in the present study had gynecomastia, and both were diagnosed with IDC. In a study of 642 MBC patients, gynecomastia was associated with a significantly increased risk of developing breast cancer. Even after adjusting for multiple variables, the association remained strong [12].

In the current study, 60% of the cancers were located on the left side, while 40% were right-sided. Although the sample size is limited, this distribution is consistent with existing literature, which generally shows a slight predominance towards the left side. In a large analysis, 4,190 MBC were diagnosed in the left breast versus 3,868 in the right breast, giving a laterality ratio of 1.08 (95% CI: 1.03–1.13) [13]. However, in a smaller sample-sized study by Ilhan et al., breast cancer was located almost equally on the right side in 11 (52.3%) cases and on the left side in 10 (47.7%) cases [12].

A breast mass was the most common presenting symptom (80%), consistent with previous findings [10,12]. Soliman and Hetnał [10] reported a 100% incidence of breast mass in 39 MBC cases, with axillary involvement in 30%, which was higher than that in the present study. Similarly, Ilhan et al. found breast mass

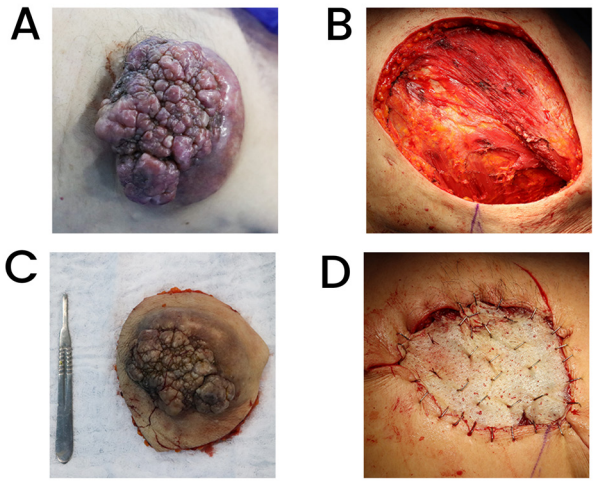

Figure 3. A) Preoperative image showing an advanced ulcerated, nodular, and fungating breast tumor with an irregular surface, likely indicative of late-stage male breast cancer. **B)** Intraoperative image following a radical mastectomy, revealing an extensive excision of subcutaneous tissue and underlying structures. **C)** Excised specimen, including the tumor and surrounding skin, placed next to a scalpel for size reference. **D)** Postoperative image showing skin graft reconstruction with multiple sutures securing the graft to cover the large defect after mastectomy.

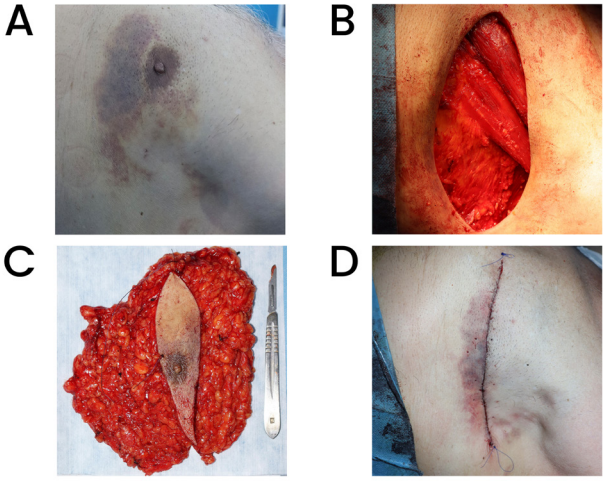

Figure 5. A) Preoperative image showing a male breast with post-core biopsy pigmentation. The lesion extends from the nipple-areolar complex toward the lateral central part, appearing irregular and enlarged. **B)** Intraoperative view after wide local excision, exposing subcutaneous fat and muscle. Clean surgical margins are evident. **C)** Excised specimen, including skin, subcutaneous fat, and nipple, with a scalpel for scale reference. **D)** Postoperative image showing a well-sutured wound with mild bruising and no signs of complications.

Figure 4. A) Preoperative image of a male patient showing visible enlargement of the right breast, centrally extending toward the upper outer quadrant, with no other apparent skin changes. **B)** Intraoperative image of a skin-sparing and nipple areola complex sparing mastectomy, with an incision above the nipple-areolar complex, exposing subcutaneous fat and underlying tissues. **C)** Postoperative image showing bilateral mastectomy scars (left prophylactic mastectomy) with nipple preservation.

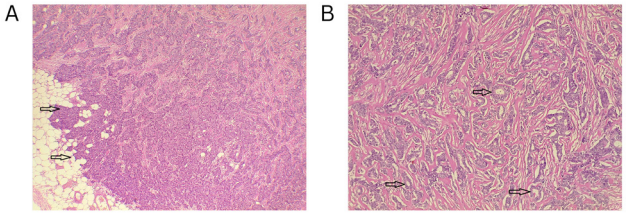

Figure 6. A) Low-power view (H&E, 4×) of the tumor, showing solid sheets of malignant epithelial cells infiltrating the surrounding adipose tissue (dark arrows). **B)** High-power view (H&E, 40×) of another area of the tumor, showing malignant epithelial cells forming ducts (dark arrows) within a desmoplastic stroma.

in 85.7% of their 21 cases [13]. Nipple discharge was observed in 6.67% of cases, consistent with Ambareen et al., who reported a comparable incidence of 6% [2].

Initial diagnosis of MBC often occurs at a later stage than in FBC, and MBC often exhibits more advanced disease features, such as a larger tumor size [14]. Studies have reported mean sizes of 3.5, 2.4, and 6 cm [2,7,14]. The mean tumor size in the current study was 2.53 ± 1.50 cm, comparable to previous findings [2,8].

Regarding tumor location, MBC most commonly occurs in the subareolar region, whereas FBC typically presents in the upper-outer quadrant of the breast [8]. This pattern was also observed in the present study, with 66.66% showing centrally located tumors. Similarly, Ilhan et al. reported central tumor location in 90.4% of cases [12]. In contrast, Zhao et al. found a lower rate, with only 37.5% of tumors located centrally [11].

Approximately 90% of male breast malignancies are classified as IDCs, which are characteristically associated with elevated expression of hormone receptors. This biomolecular profile renders them highly amenable to hormone-based therapeutic interventions, often resulting in favorable clinical outcomes [15]. In contrast, invasive lobular carcinoma is exceedingly uncommon in the male population, primarily due to the absence of terminal ductal lobular units in the male breast. Its occurrence is typically restricted to individuals with increased exposure to endogenous or exogenous estrogens [14]. In the present study, 93.33% (14 of 15) of cases were IDC, either of the non-specific type or in conjunction with other histopathological subtypes.

In a case series on MBC, histological grade II was the most frequently reported, accounting for 54–58% of cases, followed by grade III (17–33%) and grade I (12–20%) [16]. The distribution of tumor grade in the current study generally aligns with these trends, but demonstrated a higher proportion of grade III tumors, highlighting the need for tailored treatment strategies and further investigation into the biological mechanisms underlying increased tumor aggressiveness in MBC.

Compared to FBC, MBC tends to present with higher lymph

Table 3. Management and Follow-Up of Male Breast Cancer Patients

Variables	Frequency (%)
Surgical approaches	
MRM & axilla sampling	6 (40.00%)
MRM + ALND	7 (46.66%)
WLE	1 (6.67%)
NASM	1 (6.67%)
Histopathological findings	
IDC of NST	7 (46.66%)
IDC of NST + DCIS	5 (33.33%)
IDC of NST with High Grade DCIS + Paget	1 (6.67%)
IDC of Papillary Type and Extensive DCIS	1 (6.67%)
High-grade sarcoma favoring undifferentiated pleomorphic sarcoma	1 (6.67%)
Tumor grades	
Grade I (Well-differentiated)	0 (0.00%)
Grade II (Moderately differentiated)	7 (46.67%)
Grade III (Poorly differentiated)	6 (40.00%)
Grade IV (Undifferentiated)	0 (0.00%)
N/A	2 (13.33%)
Immunohistochemical findings	
ER+/PR+/HER2-	5 (33.33%)
N/A	10 (66.67%)
Lymph node involvement	
No involvement	9 (60.00%)
Single node	4 (26.67%)
Multiple nodes	2 (13.33%)
Distant metastasis	
Bones	1 (6.67%)
None	14 (93.33%)
Adjuvant therapy	
Chemotherapy & radiotherapy	5 (33.33%)
Radiotherapy & hormone therapy*	1 (6.67%)
Chemotherapy & radiotherapy & hormone therapy*	3 (20.00%)
Chemotherapy alone	1 (6.67%)
Radiotherapy alone	1 (6.67%)
Hormone therapy alone*	1 (6.67%)
No adjuvant therapy	3 (20.00%)
Follow-up (years), mean ± SD	2.8 ± 1.52
Outcome	
Recurrence	1 (6.67%)
Remission	14 (93.33%)

MRM: *modified radical mastectomy,* ***ALND:*** *axillary lymph node dissection,* ***WLE:*** *wide local excision,* ***NASM:*** *nipple-areolar sparing mastectomy,* ***IDC:*** *invasive ductal carcinoma,* ***NST:*** *non-specific type,* ***DCIS:*** *ductal carcinoma in situ,* ***ER:*** *estrogen receptor,* ***PR:*** *progesterone receptor,* ***HER2:*** *human epidermal growth factor receptor 2,* ***SD:*** *standard deviation,* ***N/A:*** *not available.* **Tamoxifen*

node involvement and distant metastases at the time of diagnosis [1]. In the present study, 60% of cases showed no evidence of lymph node involvement, whereas 40% exhibited varying degrees of lymphatic spread, and bone metastasis was recorded in one case. Similarly, Zhao et al. reported a nodal involvement rate of 44.1%. However, El Fouhi et al. reported a nodal involvement rate of 82% [11,15].

Typically, men with breast cancer are treated with MRM, often accompanied by ALND or sentinel lymph node biopsy. However, in selected cases, breast-conserving surgery, as well as nipple-sparing or skin-sparing mastectomies, may also be considered [14]. Performing ALND is linked to considerable postoperative morbidity, including lymphedema, infection, and sensory disturbances such as axillary paresthesia [17]. In the present study, thirteen patients (86.66%) underwent MRM, seven of whom (46.66%) underwent MRM accompanied by ALND, and one patient underwent nipple-areolar sparing mastectomy. This is comparable to a previous study in which 90% of MBC patients opted for MRM [1].

Chemotherapy regimens for MBC are comparable to those used in FBC [5]. In a prospective study conducted by the American National Cancer Institute between 1974 and 1988, involving 31 MBC patients with lymph node metastases treated with adjuvant chemotherapy, overall survival rates at 5, 10, and 20 years were reported as 80%, 65%, and 42%, respectively [5]. In the present study, nine patients (60%) received chemotherapy, either alone or in combination with other adjuvant therapies, with most achieving favorable outcomes during follow-up.

Given that over 90% of MBC cases are hormone receptor-positive, endocrine therapy plays a central role in treatment. Tamoxifen remains the most utilized anti-estrogen agent in both FBC and MBC management [17]. In the present study, immunohistochemistry results were available for only five patients (33.3%), all of whom were hormone receptor positive and received tamoxifen. The apparent discrepancy with the higher rates reported in the literature likely reflects the absence of receptor status data for the remaining ten patients rather than a true difference in tumor biology.

Adjuvant radiotherapy is recommended for patients with axillary lymph node metastasis or who are undergoing breast-conserving surgery. Postoperative radiotherapy is also recommended for patients with tumors larger than 5 cm [5]. In the present study, 10 patients (66.67%) received radiotherapy, either alone or with other adjuvant therapies, with most achieving good outcomes during follow-up.

Management of MBC is controversial due to reliance on female-based data [6]. Key debates involve mastectomy versus breast-conserving therapy, unclear indications for radiotherapy, and the choice and duration of endocrine therapy (tamoxifen vs aromatase inhibitors ± GnRH analogues). The role of genomic assays in guiding chemotherapy, systemic therapy strategies in advanced disease, risks of under- or overtreatment, and psychosocial effects of radical surgery also remain unresolved [6].

Breast cancer in males exhibits distinct recurrence patterns influenced by tumor biology, stage, and treatment. In a cohort of 38 patients with estrogen receptor-positive, HER2-negative tumors, the distribution of the 21-gene recurrence score (RS) closely resembled that observed in FBC. Low RS (≤17) was found in 68.4% of cases, intermediate RS (18–30) in 23.7%, and high RS (≥31) in 7.9% [18]. According to a study, the rate of locoregional recurrence in MBC is approximately 10.1%, while distant recurrence has been reported in up to 21% of cases [18]. Only one case of recurrence was reported in the present study, after a median follow-up of 2.8 years.

This study had a few limitations. First, the follow-up periods were relatively short compared to other studies on the topic. Second, genetic testing and data on affected patients were lacking.

5. Conclusion

Male breast cancer may present as a breast mass and is often diagnosed as invasive ductal carcinoma. Modified radical mastectomy accompanied by adjuvant therapy might offer favorable outcomes.

Declarations

Conflicts of interest: The authors have no conflicts of interest to disclose.

Ethical approval: This study was approved by the Ethics Committee of Kscien organization (Approval No. 2025-36).

Consent for participation: Not applicable.

Consent for publication: Informed consent for publication was obtained from the patients.

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Authors' contributions: AMS, ROM, FHK, and MMA: Major contribution to the conception and design of the study, literature search, and manuscript drafting. HOB, SHS, HHF, NSS, HOA, SOA, and MKA: literature review, study design, data organization, table preparation, and critical revision of the manuscript. LRAP, FHF, AMA, RMA, and AHA: literature review and figure preparation. All authors have read and approved the final version of the manuscript.

Use of AI: ChatGPT-4.5 was used to assist with language refinement and improve the overall clarity of the manuscript. All content was thoroughly reviewed and approved by the authors, who bear full responsibility for the final version.

Data availability statement: Not applicable.

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