Intermammary breast cancer: A rare case of cancer with origin of breast cells in an unusual location

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Abstract

The most common type of cancer among the female population is breast cancer. The most common site for the occurrence of breast cancer is the upper outer quadrant; the upper inner quadrant is the second site, and both the lower outer and the lower inner quadrants are in the third place. This problem is rarely seen in the central portion. Intermammary metastasis due to breast cancer is an infrequent finding. This article presents a 62-year-old lady who presented to the surgical ward with intermammary swelling that appeared suddenly 3 months ago. Ultrasound examination showed a hypoechoic micro-lobulated mass with internal vascularity on the chest wall. Although core needle biopsy suspected invasive ductal carcinoma, both right and left axillary lymph nodes were normal and free. The patient was consulted by an oncologist who recommended radiotherapy before surgery and chemotherapy before and after surgery. This study aims to report and discuss a rare case of intermammary cancer with the origin of breast cells without breast and axillary lymph node involvement. Although the intermammary region is an extremely rare location where breast cancer could occur, its management strategy is the same as other breast cancers.

Introduction

Breast cancer is the most common cancer and one of the most important causes of death among the female population.[1] Breast cancer is a significant public health problem that can threaten patients' lives and is increasing in most parts of the world.[2] According to the GLOBOCAN 2020 report, breast cancer includes 24.5% of all new cancer cases and is responsible for 15.5% of cancer death among the female population worldwide[3] (Figures 1 and 2). In 2022, approximately 51% of all cancers of females in the United States were breast cancer, and its incidence rose to approximately 170 per 100,000 women. Also, breast cancer is the reason for 15% of death in the United States.[2,4] According to US breast cancer organization statistical studies, about 1 in 8 US women will develop invasive breast cancer during their lives.[5–7] This study concerns the importance of diagnosing and treating intermammary breast carcinoma between two breasts without axillary lymph node metastasis and breast involvement due to its rarity and threatening patients' lives. In this study, we report an extremely rare

case of receptor-positive breast cancer (estrogen receptor (ER+), progesterone receptor (PR+), and HER2−), which happened in an unusual location in the intermammary region, which has been reported only once so far,[8] of a 62-year-old female without axillary lymph nodes metastasis and breasts involvement with a brief literature review.

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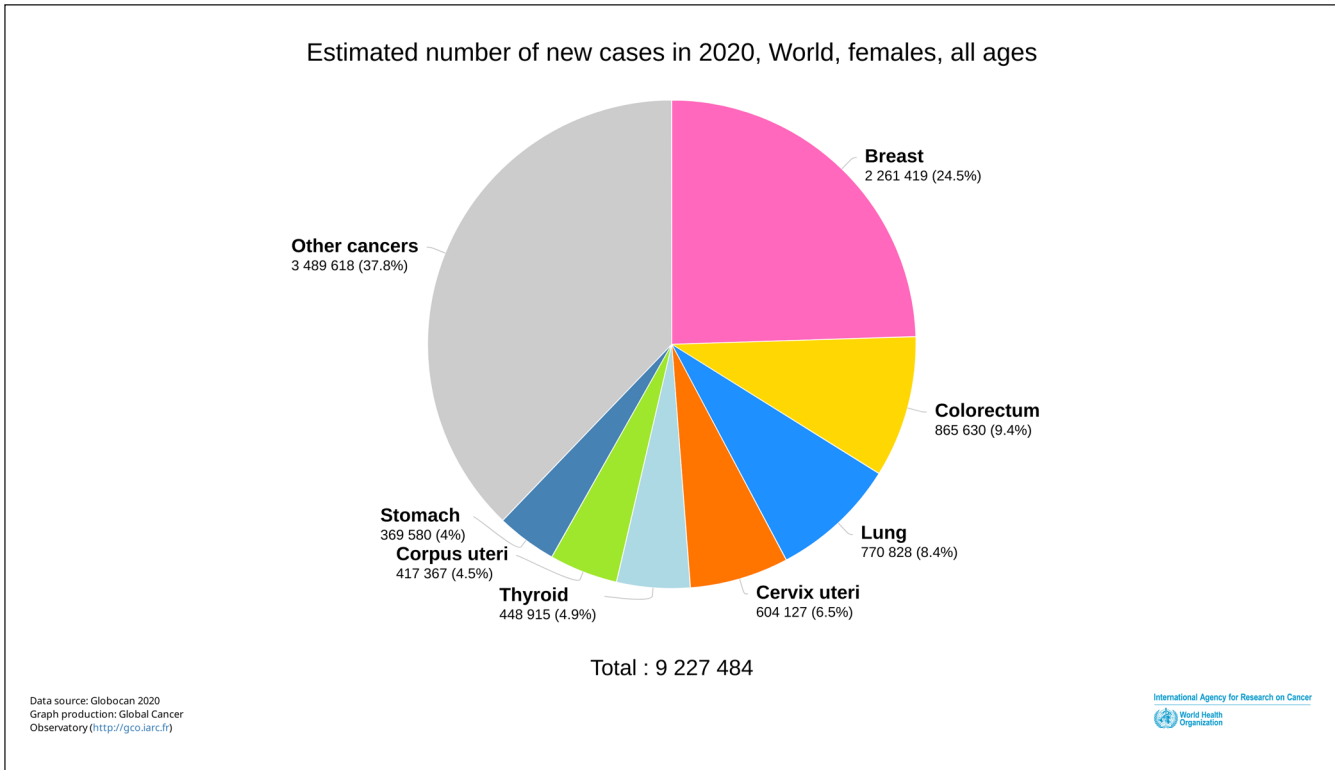Email: KasraShirini21@gmail.com

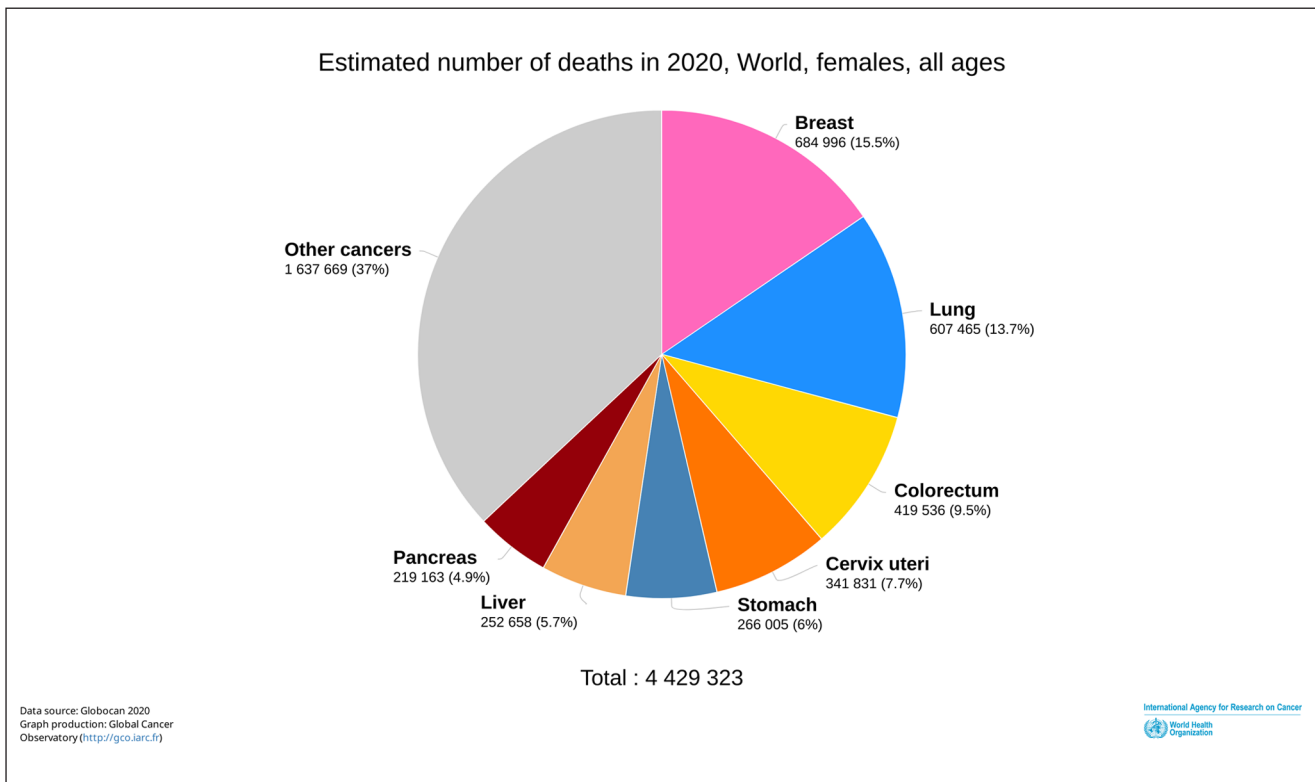**Figure 1.** WHO pie chart about breast cancer statistical analysis.

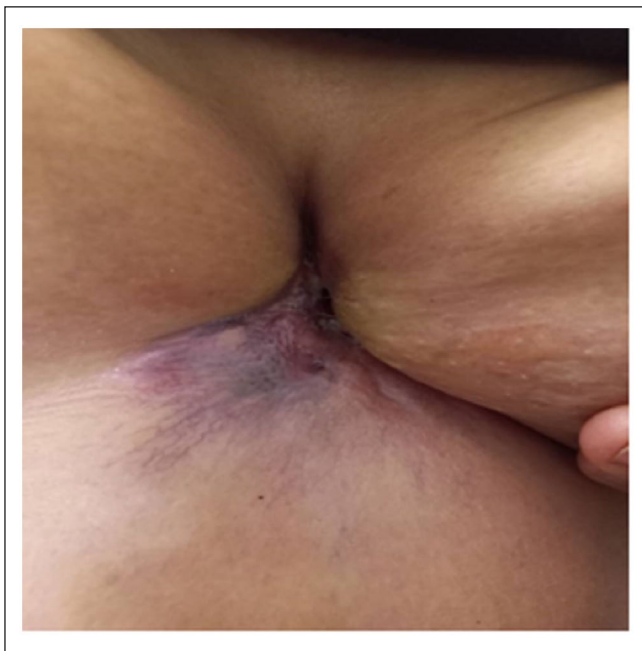**Figure 2.** WHO pie chart about breast cancer statistical analysis.

Figure 3. The intermammary mass.

Case presentation

A 62-year-old female presented to the surgical ward in October 2021 with complaints of intermammary swelling and mass, which suddenly appeared 2 months before hospitalization. The mass was enlarged gradually, extended to the upper abdomen, and ulcerated in the last 3 weeks before she presented to the hospital. Her past medical history was unmarked but revealed that she had been pregnant four times (Gravid 4, para 4) and was in a post-menopausal state. She had no history of trauma to her intermammary or breast region. The patient's family history study revealed that the patient's mother and grandmother had breast cancer. A palpable, hard, unmovable, and non-tender ulcer mass was found during a physical examination. The mass extended to the intermammary and upper abdominal area but did not extend to the breast areas. Upper abdominal skin discoloration was also seen there. The mass localization corresponded to 5th to 7th intercostal spaces, as can be seen in Figure 3. Both axillary areas' physical examinations were normal without palpable lymph nodes. Physical examination of the right and left breasts revealed nothing, especially any masses.

She was admitted to the surgical ward for more investigation. In the first step, she was asked to do a mammography, and the result showed scattered fibroglandular tissue and some glandular and dense fibrous tissue, possibly due to the patient's age and gender. Also, no mass was found on standard bilateral craniocaudal (CC) and mediolateral oblique (MLO) views.

The blood test analysis presented a high level of erythrocyte sedimentation rate (ESR) = 38 (usually should be under 15 in females) and C-reactive protein (CRP) = 60
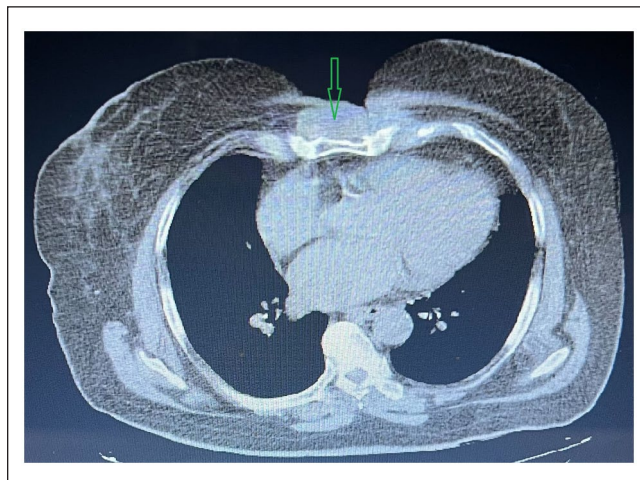

Figure 4. Chest CT scan.
The green arrow shows the intermammary tumor.

(usually should be under 6 in adults) and leukocytosis (white blood cells (WBCs) = 11,900 g/dL with a neutrophilia ratio of 79%).

Furthermore, she was asked to do ultrasonography imaging. The ultrasonography results showed a hypoechoic and micro-lobulated mass with internal vascularity, located above the lower sternum and xiphoid on the chest wall measuring about $40 \times 20\,mm$ without any mass of the two breasts. Both axillae were free of irregular lymph nodes. Next, she was advised to do a biopsy of the mass.

So, due to the suspicion of mass malignancy, a core needle biopsy was performed, and the pathology results of the sternal lesion showed invasive ductal carcinoma and poorly differentiated grade III carcinoma, with the origin of mammary cells.

Computed tomography (CT) scan revealed a $40 \times 22\,mm$ mass in the intermammary region, as can be seen in Figure 4, associated with skin thinning of the involved area on the sternum and upper abdominal area without any pathological lymph nodes at the intra-mammary region. Also, pathological lymph nodes were not seen in both axillae areas.

Positron emission tomography (PET)/CT scan showed a hypermetabolic soft-tissue mass measuring about $38 \times 21\,mm$ (standardized uptake value (SUV max) 8.7_primary tumor) in the intermammary area. On the contrary, other organs' PET/CT scans were normal without any uptake.

The patient was referred to an oncologist. He recommended radiotherapy first. However, since the patient did not consent to that procedure, according to the clinicopathological results and metastasis prevention, an urgent surgical procedure was recommended, and the patient accepted to do the procedure. So, the patient underwent surgery, and a total ulcer resection of the mass with the distal portion of the sternum with a safe margin of two breasts was accomplished for the patient. One-third of the right breast with the whole tissue above the lower part of the sternum was resected with a

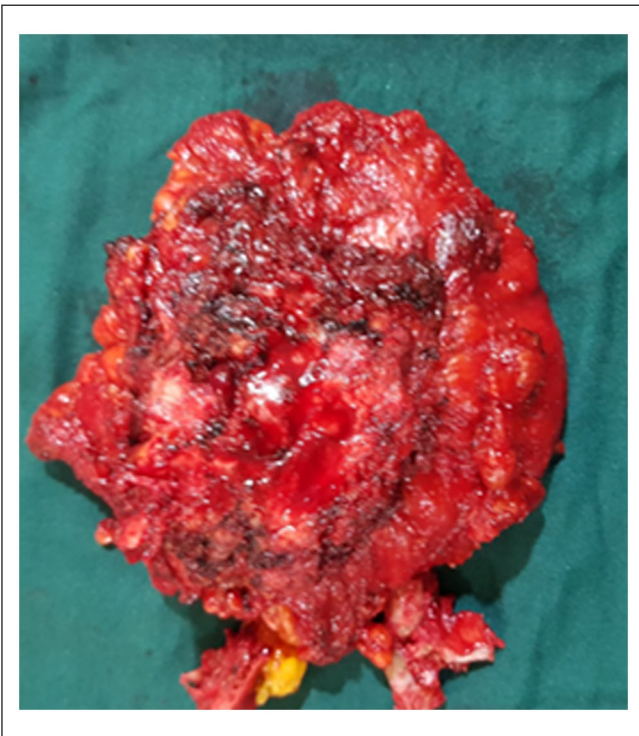**Figure 5.** The surgical procedure to eradicate the mass.

Figure 6. The mass after surgery.

free margin in the intra-operative pathologic examination, which was 4 cm, as can be seen in Figures 5 and 6, and a skin graft repaired the resection site, and the wound was closed. She had a good recovery and was transferred to the surgical ward. After 2 days, the patient was discharged from the surgical service and referred to a pathologist and an oncologist
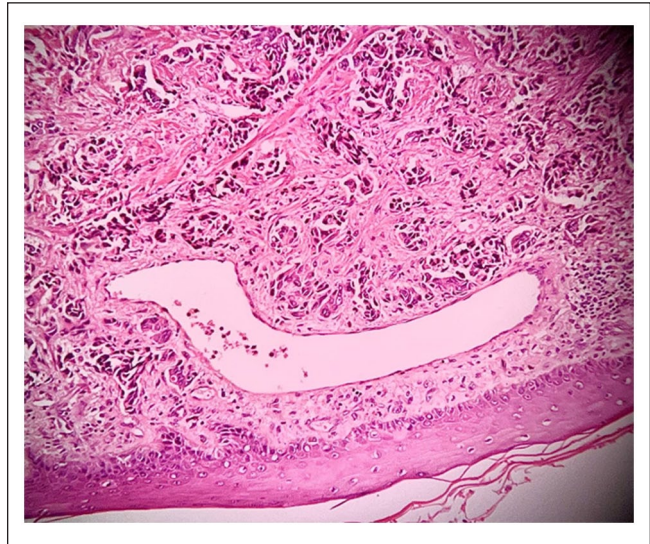

Figure 7. The microscopic view of the cancerous tissue.

for adjuvant therapy. The permanent pathologist report was intra-mammary breast cancer. The adjuvant therapy regimen included paclitaxel every 2 weeks for four sections and doxorubicin and cyclophosphamide every 2 weeks for four sections. The patient is doing well after 3 months of follow-ups after adjuvant therapy. The pathology report finally revealed histologic sections show a moderately differentiated invasive carcinoma of no special type, directly invading the skin and underlying muscle. Neither in situ component nor any breast parenchymal tissue is identified in histologic sections. The tumoral cells are diffusely immunopositive for GATA3 and ERs and PRs on IHC staining. The immunostaining for HER2, P53, TTF1, and P63 were negative. The pathological microscopic views can be seen in Figure 7.

Discussion

The World Health Organization (WHO) statistical analysis revealed that breast cancer is the most common cancer worldwide and, in our country, Iran, among the female population in 2020.[1,4,7] The upper outer quadrant area of the breast is the most common site of breast cancer occurrence.[1,5] The incidence of breast cancer is 1 in 8 women, and more than 80% of the patients are more than 50 years old.[9] Statistical studies demonstrated that breast cancer includes approximately 24.5% of all cancer cases and 15.5 of all cancer death among women population worldwide.[10,11] The most common location of breast cancer is the upper outer quadrant site of the breast, which occurs in one-third of patients, and the second most common site is the upper inner quadrant. However, the lower outer quadrant and lower inner quadrant are less common, and just in 5.2% of patients, cancer occurs in these sites. However, the intermammary is rare in this disease.[9,12]

Various risk factors are known for breast cancer, such as age, sex, family history, drug history, genetic changes and

damage, and body mass index (BMI). The most common risk factor for breast cancer is age, especially in women older than 55.[13] The breast is a sensitive estrogen organ, and using some drugs, such as contraceptive pills, increases the risk of breast cancer because of breast enlargement after taking them, as Soroush et al.[14] study confirmed this fact.[4] Family history is another risk factor for breast cancer that can cause women's anxiety. Some studies show the importance of using a combination of family history score (FHS) and age in determining the prognosis of the disease.[13,15] BMI is another risk factor in patients, especially post-menopausal women, and is associated with a poorer prognosis.[16,17] Genetic mutation and alternation specifically BRCA1 and two and some other genes, such as TP53, PTEN, and PALB2, due to deoxyribonucleic acid (DNA) damage, could increase the risk of breast cancer.[2,4]

Palpable breast mass presents as a physical exam-finding feature in a significant number of patients with breast cancers.[18] Some other findings during physical examination are pain, ulcer, skin redness and thickening, nipple discharge, and retraction.[8,19] The most common site of lymphatic drainage of all types of breast cancers is the ipsilateral axillary lymph nodes. The second way of drainage is the internal mammary chain.[19] Another way of draining is drainage into the intra-mammary, sub-clavicular, interpectoral, and supra-clavicular lymph nodes.[7] Also, rare presentation such as pancytopenia due to bone marrow metastasis was reported in breast cancer patients.[19,20]

Breast cancer can be diagnosed using different imaging techniques and histopathological methods.[20] Mammography is the first standard screening technique, and ultrasonography can be used to detect the mass.[20,21] In our case, mammography and ultrasonography were the first choices due to the suspicion of the possibility of breast cancer metastasis. Using this imaging method could help detect breast cancer early and reduce breast cancer mortality.[21] Some studies show that mammography has lesser diagnostic value for patients under the age of 40 years because of the density of the breast at this age. On the contrary, it is not helpful enough for small tumors because it cannot detect tumors smaller than 1 mm.[22] The importance of using mammography becomes apparent when it knows that the overall mean size of clinically detectable cancer tumors is 2.6 cm, significantly larger than those found on screening mammography at 1.5 cm.[23] On the contrary, ultrasonography was shown to have similar effectiveness to mammography in detecting breast cancer.[20,23]

Lehman et al.[23] reported that ultrasound has a sensitivity of 95% compared to mammography of (61%). Also, Devolli-Disha et al.[24] demonstrated that ultrasound had a higher sensitivity for women under 45 compared to mammography (73.5% vs 38.5%). However, mammography had a higher sensitivity for women older than 60 years old (73.5% vs 63.5%). Houssami et al.[25] reported that ultrasound has higher sensitivity in women below 45 years.

Zheng et al. study showed that ER/PR+ HER2− patients using both the ultrasonography method and magnetic resonance imaging (MRI) is more valuable in diagnosing the disease.[26,27]

MRI is another important diagnostic tool that can be used for monitoring the response to the treatment, high-risk patients, and detection of metastasis [7,26] But MRI is used in complex cases because of the cost problem in our country.

PET scan is another imaging method to determine metastasis or breast cancer recurrences. Yang et al.[28] show 85% of sensitivity and 79% specificity for detecting distance metastasis in breast cancer.

The main aim of doctors for breast cancer is early diagnosis with a screening program and following the patients to improve the patient's health condition and increase the survival rate.[7] Hormonal therapy, mastectomy, chemotherapy, and radiation therapy are different breast cancer therapy methods.[2,5,29] In the case of non-metastatic breast cancer, the choice of treatment is to cure cancer, eradicate the tumor and the surrounding lymph nodes, and prevent the recurrence of the disease with a free margin,[29] as what is done for our case.

Using screening methods can help improve patients' health conditions. Sechel et al.'s study[30] demonstrate that in breast cancer found by screening program, the lymph node involvement is 18%–25%, compared with non-screenings, where the involvement of lymph nodes is 38%–45%.[29] Another prognostic factor that could affect patients' health conditions is tumor size. The 5-year survival rate for tumors of less than 1 cm is 99%, and for tumors of 3–5 cm in size is 86%.[9] As mentioned above, using different imaging methods, such as mammography and ultrasonography, for tumors bigger than 2.5 cm is useful. So, as can be seen, screening programs for detecting breast tumors increase the survival rate significantly and improve women's health conditions worldwide.

So, our medical team decided to do radical surgery and then prepare adjuvant chemoradiotherapy for the patient.

Conclusion

Breast cancer is one of the most common cancers in the women's population that could threaten women's lives. The most common site of occurrence is the upper outer quadrant. However, the intermammary region could be an infrequent site for the development of breast cancer. As usual, the therapy methods used in these cases are neoadjuvant therapy and preparing a surgery. However, we performed radical surgery and adjuvant therapy due to its unusual location and the patient's condition.

Author contributions

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