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An Unusual Cutaneous Recurrence of Carcinoma in the Mastectomy Bed and Its Imaging Features: A Case Report

Authors' Contribution:
Study Design A
Data Collection B
Statistical Analysis C
Data Interpretation D
Manuscript Preparation E
Literature Search F
Funds Collection G

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Conflict of interest: None declared

Patient: Female, 44
Final Diagnosis: Cutaneous recurrence of carcinoma in the mastectomy bed
Symptoms: Palpable lump
Medication: —
Clinical Procedure: —
Specialty: Radiology

Objective: Challenging differential diagnosis

Background: Chest wall recurrences of carcinoma after mastectomy usually involve subcutaneous tissue or the deep muscular layer. Recurrences arising in the skin are rare, and there are few reports of the associated radiologic features. This report presents an unusual case of cutaneous recurrence in the mastectomy bed and demonstrates its radiologic features using sonography and magnetic resonance imaging (MRI).

Case Report: A 44-year-old woman presented with a palpable lump in the inferomedial area of the right chest wall. Six years ago, she had undergone total mastectomy for ductal carcinoma *in situ* in her right breast. Sonography showed an indistinct, oval, heterogeneous echoic mass measuring 0.9 cm, confined within the skin layer, corresponding to the palpable lump. A color Doppler sonogram showed minimal, spotted vascularity in and around the mass. Sonography-guided fine-needle aspiration biopsy was performed, revealing multiple clusters of atypical cells, suggestive of ductal carcinoma. On subsequent breast MRI, the mass, measuring 1.3 cm, was again localized to the skin; dynamic contrast-enhanced scans showed a circumscribed margin, oval shape, and rim enhancement (morphology) and slow initial enhancement and persistent delayed enhancement (kinetics). The mass was surgically excised and the pathological examination confirmed the diagnosis as recurrent invasive ductal carcinoma in the dermis.

Conclusions: Cutaneous recurrence in the mastectomy bed can manifest as a mass with suspicious radiologic features: indistinct margin on the sonogram and rim enhancement on the MRI. Awareness of such radiologic features may aid in differentiating between the various cutaneous manifestations encountered after mastectomy.

MeSH Keywords: Breast • Mastectomy • Neoplasm Recurrence, Local

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Background

Local recurrences of carcinoma after mastectomy without reconstruction are reported to develop at an annual rate of 0.2–1% [1]. Although all types of mastectomy succeed in eliminating a majority of the breast tissues, the risk of recurrence still persists owing to the carcinoma cells that remain along the chest wall [1]. Although recurrences in the chest wall can be perceived on clinical examination as palpable lumps, skin thickening, retraction, edema, and redness, these findings are likely to be mistaken for post-treatment changes [1].

This report presents a rare case of cutaneous recurrence in the chest wall after mastectomy, and describes its radiologic features on sonography and breast magnetic resonance imaging (MRI). Only 9 cases of chest wall recurrences in the skin have been reported in the literature [2–4]. Among these, sonographic features were reported only in 2 cases [3,4] and MRI features were reported in only 1 case [3]. In our present case report, the clinical, sonographic, and MRI features of cutaneous recurrence in the mastectomy bed are described.

Case Report

A 44-year-old woman presented with a palpable lump in the inferomedial area of the right chest wall. Six years ago, she had undergone total mastectomy for ductal carcinoma *in situ* in her right breast. Immunohistochemical biomarkers were positive for estrogen receptors (ER) and progesterone receptors (PR), and negative for human epidermal growth factor 2 (HER2); levels of Ki-67were low (1%). Neither chemotherapy nor radiation therapy was performed after the mastectomy. Four years after the mastectomy, a chest wall recurrence developed below the operation site. Local excision revealed a 1.1 cm invasive ductal carcinoma with ductal carcinoma *in situ*. Immunohistochemical biomarkers were positive for ER and PR, negative for HER2, and Ki-67 was expressed at a low level (5%). After the excision, she has been periodically followed up both clinically and radiologically, in addition to taking hormone treatment (Tamoxifen and Zoladex).

At the current presentation, sonography of the right chest wall showed an indistinct, oval, heterogeneous-echoic mass, 0.9 cm in size, confined entirely within the skin, corresponding to the palpable lump (Figure 1A, 1B). A color Doppler sonogram showed minimal, spotted vascularity in and around the mass (Figure 1C, 1D). Based on the suspicious clinical presentation

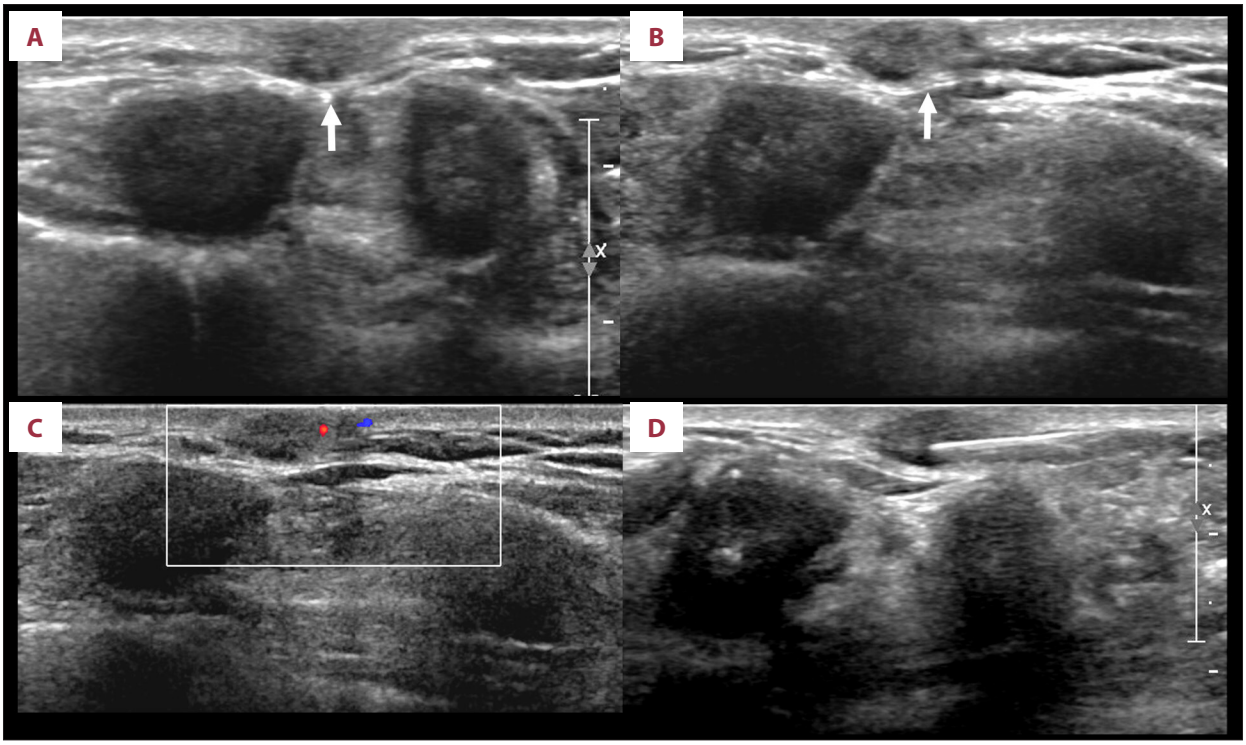

Figure 1. The (**A**) transverse and (**B**) longitudinal grayscale sonograms of the inferomedial area of the right chest wall show an indistinct, oval, heterogeneous-echoic mass, 0.9 cm in size, located within the skin. (**C**) Color Doppler sonogram shows minimal, spotted vascularity in and around the lesion. (**D**) Transverse sonogram on real-time sonography-guided fine-needle aspiration biopsy shows the needle tip penetrating the lesion.

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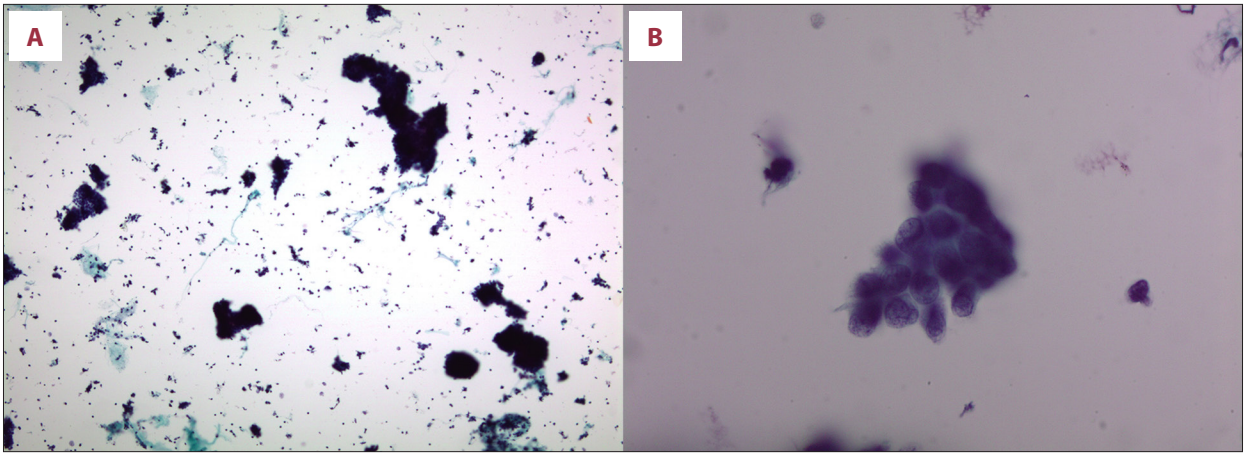

Figure 2. (**A**) Fine-needle aspiration of the mass reveals large, 3-dimensional cell clusters. (SurePath, Papanicolaou stain, ×100). (**B**) The tumor cells show irregular nuclear membranes with increased nuclear-cytoplasmic ratio (SurePath, Papanicolaou stain, ×1000).

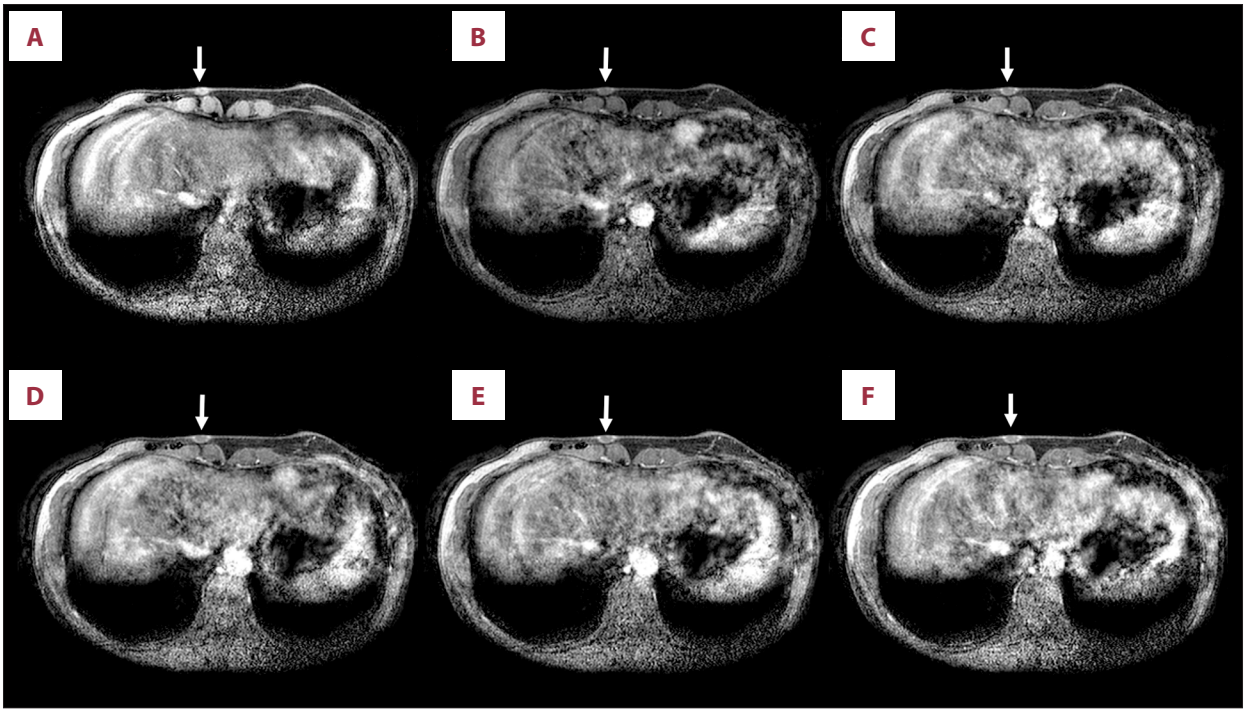

Figure 3. The (**A**) pre-contrast scan, and (**B–F**) first, second, third, fourth, and fifth post-contrast dynamic scans of the right breast show a 1.3-cm mass (arrows) with morphologic patterns of oval shape, circumscribed margin, and rim enhancement, and kinetic patterns of slow initial enhancement and persistent delayed enhancement.

and the indeterminate sonographic morphology, the radiological assessment was BI-RADS (Breast Imaging Reporting and Data System) category 4. Sonography-guided fine-needle aspiration biopsy was performed for the mass, yielding a sample sufficient for cytologic analysis. A liquid-based cytology slide of the fine-needle aspiration revealed multiple 3-dimensional cell clusters with isolated cells in the background (Figure 2A). On high-power microscopic examination, the cells showed prominent nuclear atypia, suggestive of carcinoma (Figure 2B).

Breast MRI was then performed as part of preoperative surveillance. Dynamic contrast-enhanced scans of the breast MRI consisted of 1 pre-contrast and 5 sequential post-contrast T1-weighted sequences (Figure 3). After contrast injection, the mass was clearly defined in the skin and measured 1.3 cm; it demonstrated the morphological features of circumscribed margin, oval shape, and rim enhancement and the kinetic features of slow initial enhancement and persistent delayed enhancement (Figure 3). The mass was surgically excised and

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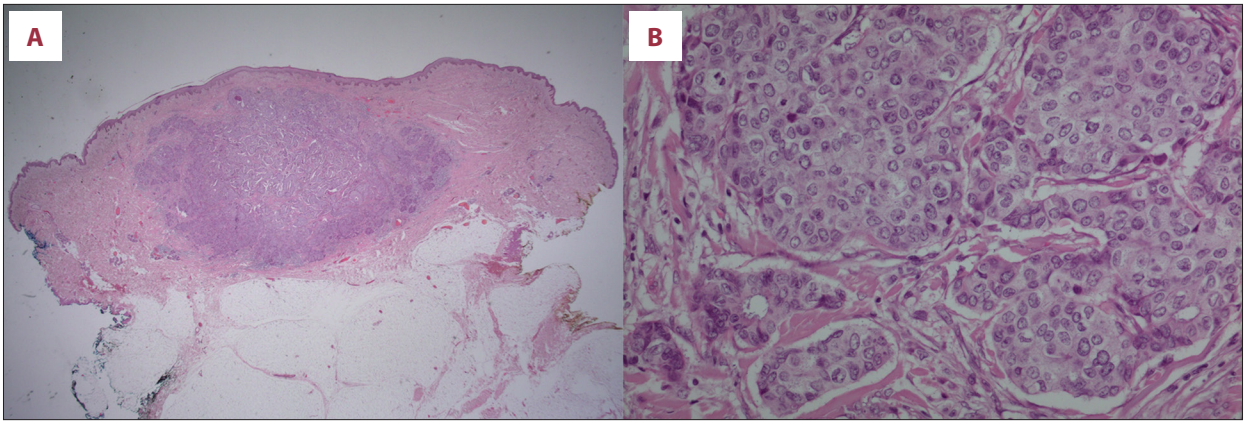

Figure 4. (**A**) Low-power micrograph shows a nodular mass in the dermis with intact epidermis (hematoxylin and eosin, ×12.5). (**B**) High-power view shows solid nests of atypical epithelioid cells and focal duct formation (hematoxylin and eosin, ×400).

a low-power micrograph of the skin excision showed a relatively well-defined nodular mass in the dermis (Figure 4A). On higher magnification, the tumor was seen to be composed of solid nests of atypical epithelioid cells showing focal duct structures (Figure 4B). Immunohistochemical stains demonstrated that the tumor cells were positive for ER and PR and negative for HER2, supporting the diagnosis of recurrent ductal carcinoma of the breast.

Discussion

This is an unusual case of cutaneous recurrence in the mastectomybed. The recurrent cancer exhibited oval shape, indistinct margin, heterogeneous echotexture on sonography, and oval shape, circumscribed margin, rim enhancement, slow initial enhancement, and persistent delayed enhancement on MRI. The features of indistinct margin on sonography and rim enhancement on MRI favored the diagnosis of malignancy.

Reported rates of chest wall recurrence after mastectomy are 5–27% [1]. For survivors of breast cancer, medical history, physical examinations, and periodic mammography are the current recommendations for post-treatment surveillance [5]. Mammography is the only imaging modality proven to accurately detect asymptomatic recurrences [5]. However, the chest wall cannot be easily approached by mammography; instead, this can be done using sonography [4].

The normal anatomy of the chest wall after mastectomy comprises 4 layers: skin, subcutaneous fat, pectoralis muscles, and ribs and intercostal muscles [3]. Previous studies showed that recurrences at the mastectomy site most commonly involve the subcutaneous fat and deep muscular layer, but not the skin [6,7]. Lee et al. reported that among 10 sonography-detected occult recurrences at mastectomy sites during a 36-month follow-up period, 7 were located in the deep muscular layer [6]. Kim et al. also found that among 10 sonography-detected occult recurrences at mastectomy sites during a 34-month follow-up period, 8 were located in the intramuscular layer and 2 in the subcutaneous fat [7]. Rissanen et al. reported that among 61 recurrences at mastectomy sites detected through clinical examination, mammography, or sonography during a 35-month follow-up period, 46 recurrences were located in the subcutaneous tissue, 1 deep in the chest wall, and 7 in the skin [2]. To the best of our knowledge, only 9 cases of cutaneous recurrence at mastectomy site have been reported in the literature [2–4]. Among these cases, radiologic features were specifically presented only in 2 cases, as figures illustrated in the review articles [3,4].

Mastectomy does not remove the entire breast tissue, but leaves a small amount of tissue along chest wall [1]. The use of imaging for post-mastectomy surveillance of the remaining tissue is still under debate, with some facilities not performing any imaging at all [1]. Although clinical examination can easily reveal recurrent cancers in the skin, it is difficult to discriminate these recurrences from post-treatment changes [3,8]. Mammography is usually not suitable for detection of early locoregional recurrence at the mastectomy site because of technical difficulty, patient discomfort, poor visibility, and low sensitivity [6,7,9]. Sonography is also not routinely performed in the follow-up of mastectomy [10]. Nevertheless, in 1993, Rissanen et al. first suggested that sonography had a higher sensitivity (91%) than does clinical examination (79%) or mammography (45%) for the detection of recurrent cancers after mastectomy [2]. Yilmaz et al. also reported the superior sensitivity and specificity (90% and 88.9%, respectively) of sonography and MRI (100% and 100%, respectively) over clinical examination (70% and 35.2%, respectively) [8]. Several recent studies have further addressed the efficacy of locoregional sonography after mastectomy; they found the sonographic cancer detection rates to be 2.8% [11], 1.7% [7], and 2.1%,

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respectively [6]. Of these studies, the sonographic cancer detection rates in 2 studies exclusively reflect asymptomatic recurrences [6,7].

Sonographic features of chest wall recurrences after mastectomy have been infrequently reported [2,3,6,10,11]. Earlier studies reported that recurrent cancers demonstrated probably benign features on sonography [2,3,12]. Kanso et al. reported that all recurrent cancers at mastectomy sites were parallel-oriented, well-defined, hypoechoic lesions, and differentiation between benign and malignant lesions at mastectomy sites was difficult [11]. However, with technical improvements in sonography equipment, more recent studies suggest that BI-RADS final assessment can be carefully applied to lesions at mastectomy sites [6,10]. Lee et al. analyzed the sonographic features of 10 recurrences at mastectomy sites, and suggested that they commonly manifest as suspicious masses with irregular shape (50%), non-circumscribed margin (80%), non-parallel orientation (60%), hypoechoic echo pattern (80%), and intratumoral vascularity (70%) [6]. Although 5 out of 10 recurrences (50%) had oval or round shapes, at least 1 suspicious finding was concurrent (such as non-circumscribed margin, marked hypoechogenicity, or intratumoral vascularity) [6]. The reported positive predictive values of sonography for chest wall lesions at mastectomy site were 14.3% for BI-RADS category 4A, 62.5% for category 4B, 100% for category 4C, and 100% for category 5 [10]. On sonography, differential diagnoses for recurrent cancer in the mastectomy site include benign masses such as postoperative scar, foreign body granuloma, chronic inflammation, fat necrosis, abscess, hematoma, and focal fibrosis [2,3,7].The sonographic features of cutaneous chest wall recurrences were reported only in 2 cases: irregular indistinct hypoechoic lesion in one case [3] and hypoechoic lesion in the other [4].

MRI is another highly sensitive imaging modality that can be used to evaluate mastectomy sites [1,8,13]. However, studies on the utility of MRI in detecting recurrences at mastectomy sites are sparse [8]. Yilmaz et al. reported that all the 10 recurrent cancers at mastectomy sites had suspicious MRI features (sensitivity 100%); in addition, all the 17 cases without suspicious MRI features were found to be benign, as they showed no changes during follow-up (specificity 100%), although 12 of the 17 cases had suspicious lesions clinically or sonographically [8]. Moreover, 1 case of recurrent cancer was detected only by MRI [8]. MRI features of the 10 recurrent cancers included irregular (6) or smooth (4) margins, peripheral (5), diffuse (3), or heterogeneous (2) patterns of internal enhancement, and time/signal intensity curve patterns of type 3 (9) or type 1 (1) (delayed enhancement of washout and persistent patterns, respectively) [8]. In our case, the morphologic feature of rim enhancement was predictive of malignancy; however, the kinetic feature of type 1 pattern was less predictive of malignancy. Differentiation between benign and malignant lesions on MRI is based on both morphologic and kinetic features [14]. Generally, morphologic features that are predictive of malignancy are: irregular shape [13,14], spiculated or irregular margin [13,14], and rim or heterogeneous [13] or marked [14] patterns of internal enhancement. Kinetic features that are predictive of malignancy are washout [13,14] or plateau [14] patterns of delayed enhancement and fast initial enhancement [14]; however, kinetic features are known to be less predictive of malignancy than are morphologic features [14]. Nevertheless, Yimaz et al. emphasized that because benign lesions do not occur at mastectomy sites except for treatment-related changes, every type of focal contrast enhancement at the mastectomy site was assessed as suspicious for malignancy in their study; moreover, 1 out of 10 recurrent cancers showed benign type 1 pattern, similar to our case [8]. Park et al. also reported that, of the 1053 MRIs performed on women who had undergone either partial mastectomy (62.1%) or mastectomy (37.9%), the overall cancer detection rate of MRI was 6.7% (7/1053), including 4 intramammary and 3 extramammary (sternum, mediastinum, and chest wall) cancers [15]. In 1 extramammary cancer involving the chest wall, MRI findings were just briefly described as 'suspicious for malignancy' [15]. MRI features of cutaneous chest wall recurrence have been reported in only 1 case, which showed morphologic features on MRI, which were similar to our case (oval shape, circumscribed margin, and rim internal enhancement), but kinetic features were not specified in that case [4].

Conclusions

In this report, we describe a rare case of cutaneous recurrence at a mastectomy site. This case may provide some insight to radiologists that a cutaneous recurrence in the mastectomy bed can manifest as a mass with suspicious radiologic features: indistinct margin on the sonogram and rim enhancement on the MRI. Awareness of such radiologic features may aid in discriminating the various cutaneous manifestations after mastectomy, and may increase early detection of asymptomatic recurrences in the chest wall on imaging surveillance. Ultimately, earlier detection of asymptomatic recurrences though imaging surveillance enables longer survival [4,7].

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