Case Report

A Rare Case of Carcinoma Erysipeloides After TNBC Mastectomy: Challenges in Diagnosis and Implications for Treatment

Amr Ahmed[1], Maher M. Akl[2]

1. The public health department, MSc degree in Gynecology and obstetrics, Riyadh First Health Cluster, Ministry of Health Saudi Arabia, Riyadh, Saudi Arabia; 2. Mansoura University, Egypt

Background: Carcinoma erysipeloides (CE) is an uncommon but significant cutaneous manifestation of metastatic breast cancer, often misdiagnosed due to its rarity and nonspecific presentation. This is particularly true in patients with triple-negative breast cancer (TNBC), where the disease may progress undetected by conventional imaging modalities. Objective: This manuscript aims to elucidate the challenges and implications of diagnosing CE in breast cancer survivors, emphasizing the insufficiency of PET scans in detecting such cutaneous metastases and the potential for mismanagement due to diagnostic oversight. Methods: We present a detailed case study of a 43-year-old female with a history of metastatic TNBC, who developed suspicious skin lesions post-treatment. Despite initial negative PET scan results, further investigations revealed CE through histopathological examination of skin biopsies. Results: The case highlights the critical need for biopsy in the presence of new skin lesions in breast cancer survivors, irrespective of imaging results. It also underscores the possibility of lymphatic spread of CE, which could lead to life-threatening complications if not properly managed. Conclusion: The diagnosis of Carcinoma erysipeloides must be considered in patients with breast cancer presenting with unusual skin lesions. Increased vigilance and dermatological assessment should be integral to the post-cancer follow-up regimen. The findings advocate for revising current treatment protocols and guidelines to better manage and potentially prevent the complications associated with this diagnosis. Recommendations: Enhanced surveillance for dermatological changes and a more aggressive approach to the biopsy of new skin lesions in cancer patients are recommended to improve outcomes and prevent the misdiagnosis of CE.

Corresponding author: Maher M. Akl, maherakl555@gmail.com

1. Background

Carcinoma erysipeloides (CE) is an uncommon form of cutaneous metastasis primarily noted in patients previously diagnosed with malignancies, especially breast cancer. This condition, often misinterpreted as erysipelas due to its similar dermatological presentation, arises predominantly following the diagnosis and surgical treatment of triple-negative breast cancer (TNBC) [1]. TNBC, marked by the absence of estrogen receptors, progesterone receptors, and minimal HER2 expression, is notorious for its aggressive clinical course and high metastatic potential, including a propensity for lymphatic dissemination [2]. The pathophysiology of CE involves the migration of malignant cells into the lymphatic system following surgical interventions such as mastectomy and axillary lymph node dissection. These procedures can disrupt lymphatic pathways, facilitating the spread of cancer cells that subsequently lodge in the skin. The resultant dermatological manifestation includes erythematous, warm, and tender plaques, which can easily be mistaken for bacterial infections or inflammatory dermatoses [3]. The similarity in appearance to benign conditions makes CE particularly challenging to diagnose, especially in patients who are considered clinically free of the primary disease based on imaging studies, including positron emission tomography (PET) scans. PET scans, commonly utilized for oncological surveillance, detect areas of high metabolic activity typical of cancerous growths [4]. However, the metabolic signature of CE might not be sufficiently distinct, especially in its early stages or when the metastatic nodules are small. Thus, CE can remain undetected in PET scans, which rely on glucose metabolism. Cancer cells in CE might not exhibit the same level of metabolic activity as the primary tumor or other metastatic sites, leading to false negatives [5][6]. The lack of detection by PET underscores the importance of clinical vigilance and the potential need for skin biopsies in patients presenting with unexplained skin lesions post-cancer treatment [7]. This diagnostic challenge highlights the critical gap between clinical and radiological assessments in oncology, particularly in post-treatment surveillance of aggressive cancers such as TNBC. It necessitates a multidisciplinary approach to postoperative care, integrating clinical examination with radiologic imaging and, when indicated, dermatological assessment to ensure early detection and management of metastatic complications such as Carcinoma erysipeloides [8]. In this manuscript, we address a critical case of a 44-year-old female patient who suffered from triple-negative breast cancer and underwent total mastectomy followed by complete remission. Despite regular follow-ups

using PET scans to monitor any signs of metastatic spread, the patient developed cutaneous lesions that were initially misdiagnosed due to their clinical resemblance to bacterial and fungal infections. The lesions were later identified as Carcinoma erysipeloides (CE), a form of cutaneous metastasis that can mimic less severe dermatological conditions.

2. Case Report

The 43-year-old female patient of white race and Arab ethnicity was diagnosed with metastatic right breast cancer (invasive mammary carcinoma) that had extended to her lymph nodes and bones. She initially presented with a 3 cm palpable mass, along with pain, fatigue, and weight loss in the upper outer quadrant of her right breast. Mammography revealed speculated and irregular borders of the mass. Furthermore, her lymph nodes in the right axillary region exhibited firm and rubbery characteristics. Despite no prior medical history, she had a positive family history of hormonal breast cancer. The treatment regimen included chemotherapy, radiation therapy, and hormonal therapy, which she successfully underwent. However, subsequent to the treatment, she developed symptoms of Carcinoma Erysipeloides.

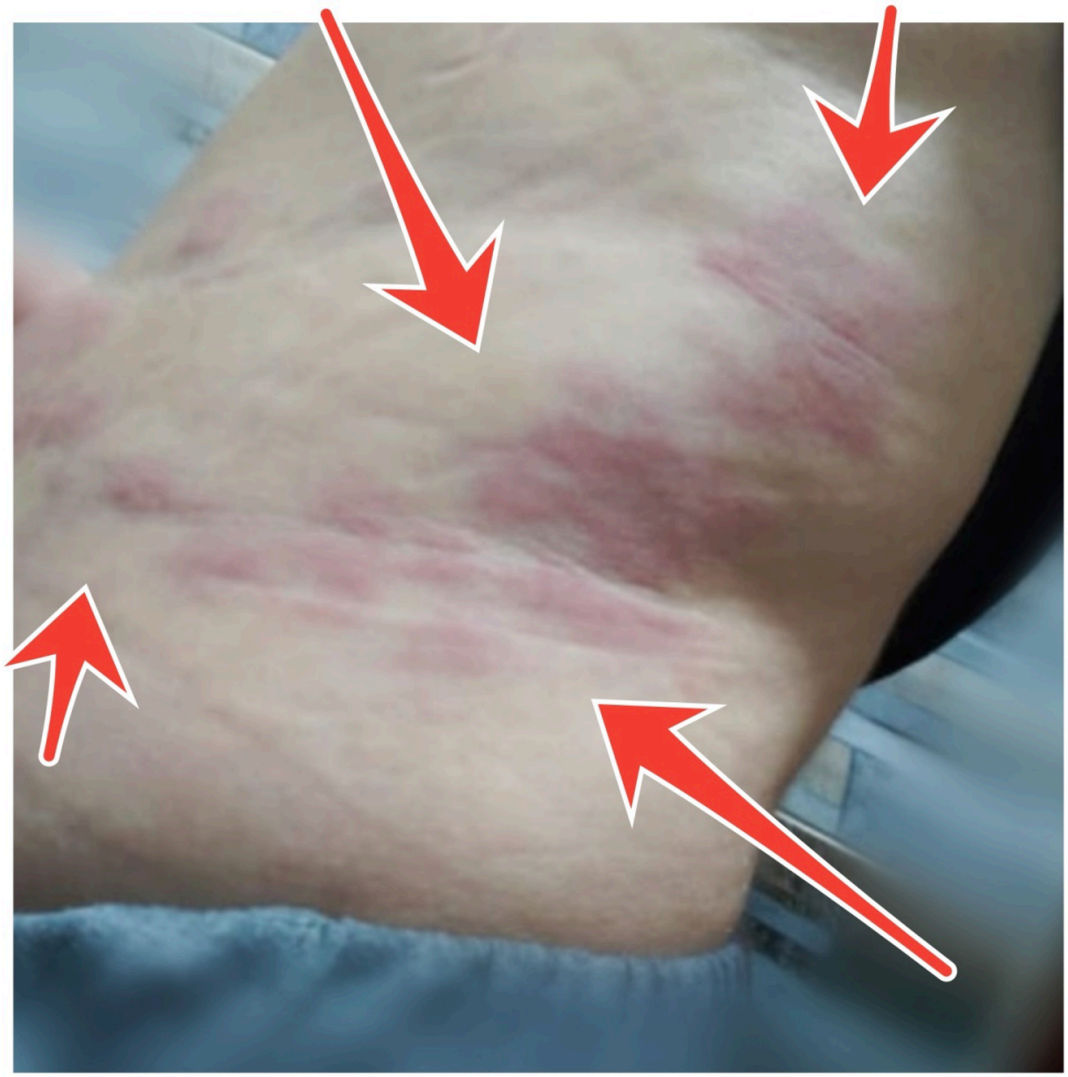

Figure 1. depicts the initial presentation of Carcinoma erysipeloides, characterized by subtle skin changes that were initially mismanaged due to the rarity of this condition. The image illustrates the early stage of this skin cancer type, where the lesions appear deceptively benign, leading to an underestimation of the severity and necessary medical intervention.

Carcinoma Erysipeloides is characterized by erythematous, edematous, and infiltrative plaques resembling cellulitis. These lesions typically exhibit heat, tenderness, and possible ulceration, often with an indurated border. Diagnosis can be challenging due to its similarity to other dermatological conditions. Upon consultation with physicians, there was a misdiagnosis likely due to reliance on PET scan reports that indicated reduced tumor activity post-treatment. Given the rarity of Carcinoma

Erysipeloides, particularly in cases of breast Paget disease, conventional treatment protocols were followed, which might have adverse effects on or exacerbate symptoms of Carcinoma Erysipeloides.

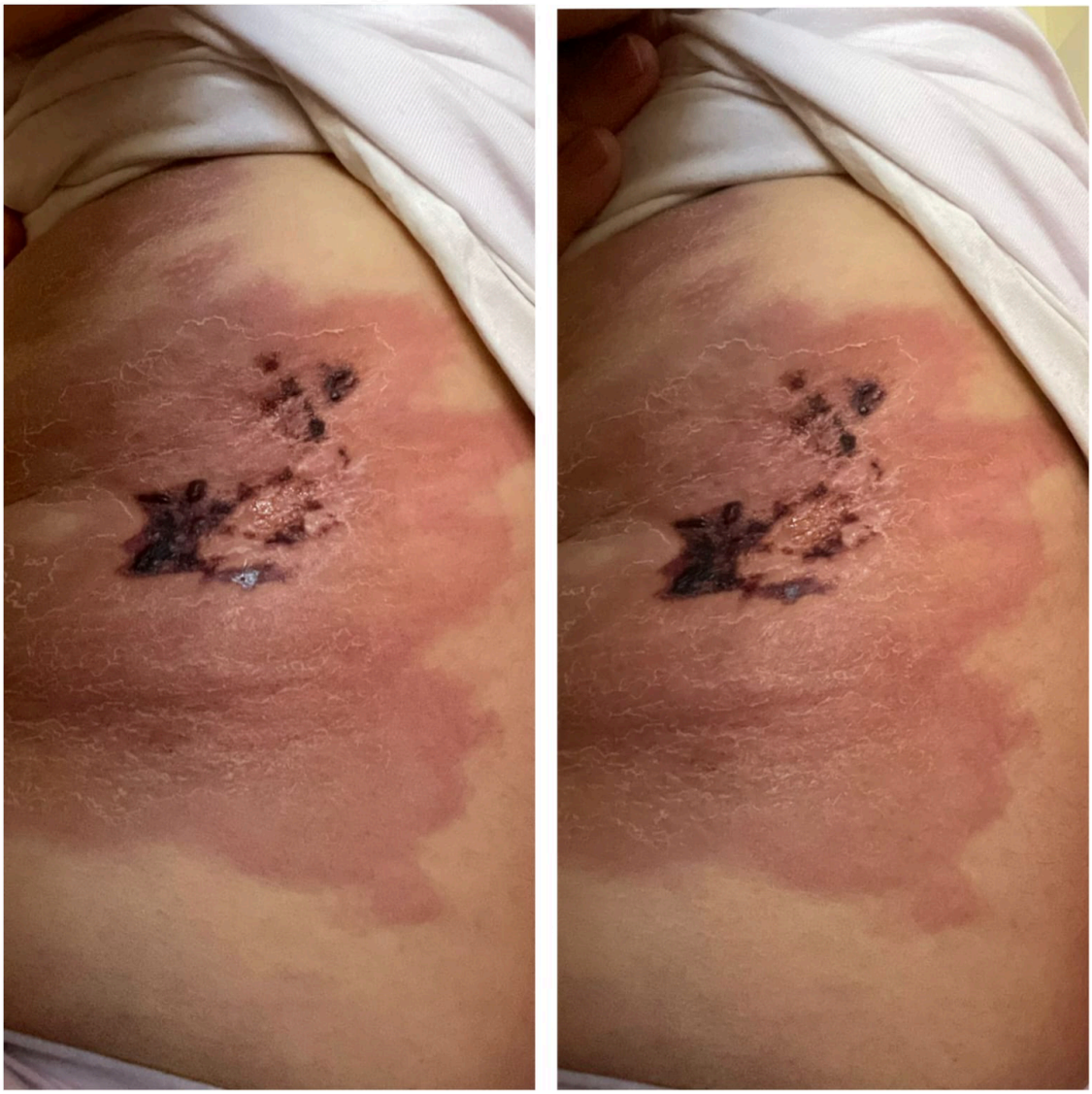

Figure 2. showcases the progression of Carcinoma erysipeloides following an initial diagnostic error. The image captures the exacerbated condition of the skin tumor, displaying extensive erythematous lesions with raised borders that indicate a severe advancement of the disease due to delayed recognition and appropriate treatment of this cancer type.

doi.org/10.32388/ARI90M

2.1. Diagnostic Biopsy Examination

The specimen, a 1.5 cm skin nodule excised from the abdominal area, appeared firm and erythematous upon gross examination, with no other abnormalities noted. Microscopic analysis revealed clusters of atypical epithelial cells infiltrating the dermal layer, indicative of metastatic carcinoma. These cells were characterized by irregular nuclei and scant cytoplasm, with evident surrounding dermal lymphatic invasion suggesting potential lymphatic spread. Immunohistochemical staining confirmed negative statuses for Estrogen Receptor (ER), Progesterone Receptor (PgR), and HER2, with scores respectively noted as negative on-slide while positive control cells stained as expected, confirming the accuracy and specificity of the procedure. The diagnosis was metastatic carcinomatous deposits in an abdominal skin nodule with ER, PgR, and HER2 all showing negative results. Recommendations underscored the inclusion of positive and negative controls in the immunohistochemistry run for each antibody, and both cold ischemia and fixation times met the ASCO/CAP guidelines requirements.

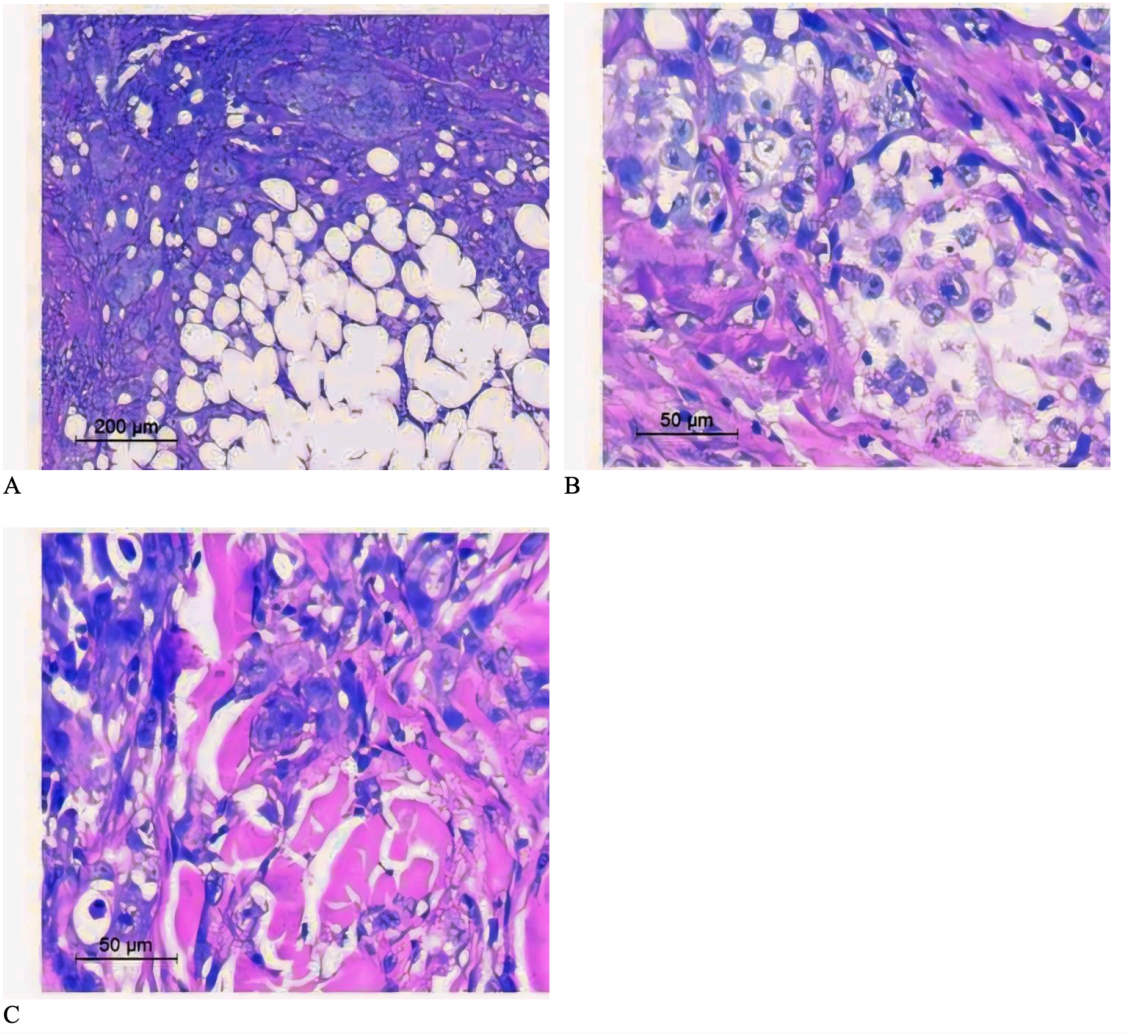

Figure 3. provides a detailed visual representation of the pathology results for Carcinoma erysipeloides. The image illustrates microscopic slides that clearly display the presence of metastatic carcinomatous deposits within the skin. The staining patterns are highlighted to emphasize the absence of estrogen receptor, progesterone receptor, and HER2 expression, confirming the aggressive nature of the metastasis and underscoring the diagnostic challenges associated with this type of skin cancer.

The comparison of these pathological findings with characteristics typical of Carcinoma erysipeloides highlights the risk of misdiagnosis, which could dangerously mislead treatment directions and endanger the patient's life due to the tumor's potential to metastasize through hematogenous or lymphatic routes to vital organs, leading to possible organ failure.

3. Discussion

The case presented underscores the perils associated with the misdiagnosis of Carcinoma erysipeloides (CE), a dermal metastasis of breast cancer, particularly within the context of triple-negative breast cancer (TNBC). The failure to correctly diagnose CE can lead to severe clinical repercussions due to the aggressive nature of the disease and its propensity for rapid dissemination. CE can spread via both hematogenous and lymphatic routes, which presents a critical risk for the progression to systemic disease involving vital organs, ultimately leading to organ failure. In patients with TNBC, the lymphatic system often serves as a pathway for tumor dissemination, and the presence of CE might indicate a more extensive, underlying systemic spread that conventional imaging techniques like PET scans might fail to detect. This oversight is due to the typically low metabolic activity of cutaneous metastases compared to primary tumors or more metabolically active metastatic sites. Consequently, reliance solely on imaging results without corroborative histopathological diagnosis can lead to under-treatment or inappropriate treatment protocols. The risk extends beyond immediate misdiagnosis. The hematogenous route allows tumor cells to circulate and invade distant organs, establishing secondary malignancies that are harder to treat and manage. This systemic spread through blood and lymphatic systems illustrates the urgent need for heightened surveillance, thorough examination, and timely intervention upon the detection of any atypical skin lesions in breast cancer survivors. This case highlights the necessity of integrating dermatological evaluations into routine follow-ups and emphasizes the importance of biopsy, even when imaging results do not suggest active disease. This approach ensures that the management strategies are appropriately tailored to address the unique challenges posed by CE, thereby averting potential complications and improving patient outcomes.

4. Conclusion

Carcinoma erysipeloides represents a critical diagnosis that must not be overlooked in patients with a history of breast cancer. There is a compelling need for heightened awareness and diagnostic precision to avert treatment missteps and enhance patient outcomes. Our findings emphasize the pivotal role of biopsy in the assessment of new skin lesions in cancer patients and suggest that conventional treatment protocols may require modification to effectively address the distinct challenges presented by CE. Recommendations for Clinical Practice:1. Increase surveillance for skin

changes in survivors of breast cancer. 2. Include a dermatological evaluation as part of routine post-cancer follow-ups. 3. Revise and augment guidelines for the biopsy of new skin lesions in cancer patients. This case makes a significant contribution to the literature by spotlighting the dangers of under-diagnosing Carcinoma erysipeloides and the critical importance of accurate and timely intervention to prevent serious complications in this vulnerable patient population.

Statements and Declarations

Informed consent: Before taking this case, information was given to the patient, and informed consent was obtained from the patient for follow-up and consent to share the investigations, figures, and any required data.

Funding information: The authors received no financial support for the research and publication of this article.

Competing interest declaration: The authors declare that there are no conflicts of interest.

Ethical approval statement or statement of informed consent for case studies: This case was conducted in accordance with the Declaration of Helsinki and meets the CARE guidelines. Informed consent was obtained from the patient for follow-up, including permission for publication of all photographs, lab, and images herein.

References

1. ^*Al Ameer, A., Imran, M., Kaliyadan, F., & Chopra, R. (2015). Carcinoma erysipeloides as a presenting feature of breast carcinoma: A case report and brief review of literature. Indian dermatology online journal, 6(6), 396-398. https://doi.org/10.4103/2229-5178.169724.*
2. ^*Yao, H., He, G., Yan, S., Chen, C., Song, L., Rosol, T. J., & Deng, X. (2017). Triple-negative breast cancer: is there a treatment on the horizon?. Oncotarget, 8(1), 1913-1924. https://doi.org/10.18632/oncotarget.12284.*
3. ^*Natale, G., Stouthandel, M. E. J., Van Hoof, T., & Bocci, G. (2021). The Lymphatic System in Breast Cancer: Anatomical and Molecular Approaches. Medicina (Kaunas, Lithuania), 57(11), 1272. https://doi.org/10.3390/medicina57111272.*
4. ^*Akay, S., Pollard, J. H., Saad Eddin, A., Alatoum, A., Kandemirli, S., Gholamrezanezhad, A., Menda, Y., Graham, M. M., & Shariftabrizi, A. (2023). PET/CT Imaging in Treatment Planning and Surveillance of Si*

nonasal Neoplasms. Cancers, 15(15), 3759. https://doi.org/10.3390/cancers15153759.

5. ^*Alexis, F., Leggett, L. R., Agarwal, N., Bakhtin, Z., & Farabi, B. (2022). Carcinoma Erysipeloides With Clinical and Dermatoscopic Features: An Overlooked Clinical Manifestation of Breast Cancer. Cureus, 14 (3), e23445. https://doi.org/10.7759/cureus.23445.*
6. ^*Bergers, G., & Fendt, S. M. (2021). The metabolism of cancer cells during metastasis. Nature reviews. Cancer, 21(3), 162-180. https://doi.org/10.1038/s41568-020-00320-2.*
7. ^*Bailleux, S., Collins, P., & Nikkels, A. F. (2022). The Relevance of Skin Biopsies in General Internal Medicine: Facts and Myths. Dermatology and therapy, 12(5), 1103-1119. https://doi.org/10.1007/s13555-022-00717-x.*
8. ^*Berardi, R., Morgese, F., Rinaldi, S., Torniai, M., Mentrasti, G., Scortichini, L., & Giampieri, R. (2020). Benefits and Limitations of a Multidisciplinary Approach in Cancer Patient Management. Cancer management and research, 12, 9363-9374. https://doi.org/10.2147/CMAR.S220976.*

Declarations

Funding: No specific funding was received for this work.

Potential competing interests: No potential competing interests to declare.