Case Report

Lung cancer metastasis to the breast mimicking inflammatory breast carcinoma on imaging

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ABSTRACT

While metastatic disease to the breast has been documented from many primary neoplasms with incidence ranging from 0.2% to approximately 2.7% among reported clinical cases, breast cancer metastases resulting from a primary lung neoplasm is significantly less commonly reported in the literature. Routes of metastatic spread of lung neoplasms include both hematologic and lymphatic routes. We present a case of biopsy proven lymphangitic spread of primary lung neoplasm to the ipsilateral breast and axillary nodes mimicking inflammatory breast cancer. It remains crucial to differentiate between extramammary diseases with metastatic deposits in the breast from a primary breast neoplasm as treatment remains very different between these entities. As in this case, the pathologic, histologic, and immunohistochemistry analyses are critical in determining the origin of the malignant cells and formulating a treatment plan.

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Case presentation

80-year-old female with past history of lung adenocarcinoma in remission on ceritinib, presented to our breast imaging center with a 3-week history of left breast erythema and left axillary lymphadenopathy refractory to antibiotic treatment. Of note, the patient had been off her ceritinib treatment for approximately 1 month as she had been unable to refill her prescription. Postsurgical history notable non–small cell lung cancer diagnosed in 2013 and treated with left lower lobectomy, pleurodesis, and chemoradiation.

Patient initially noted symptoms while abroad and was initially treated in an overseas facility, where she was treated for presumed pneumonia and moderate pleural effusions (Fig. 1). On exam, there was left axillary lymphadenopathy and erythema of the left breast which the patient first noticed several days prior to admission. Mammography and ultrasound showed diffuse skin thickening and marked edema in left breast with no focal lesion or abscess (Figs. 2 and 3).
Ultrasound of the left axilla showed at least 3 enlarged lymph nodes up to 8 mm in diameter. Despite the patient’s advanced age, given the acute onset of symptoms and clinical presentation, a short course of antibiotics was ordered with scheduled follow-up for presumed mastitis.

On presentation to our facility 13 days later, she continued to complain of left breast erythema, pain, and lymphadenopathy, which was not improving despite the use of broad-spectrum antibiotics. Physical exam revealed an erythematous and edematous left breast, without peau d’orange and a single palpable left axillary lymph node. Repeat mammogram demonstrated persistent left breast skin thickening and mild, asymmetric lymphadenopathy (Fig. 4). On targeted ultrasound-guided biopsy of one of the suspicious axillary lymph nodes, mild eccentric cortical thickening up to 6 mm was noted (Fig. 5). Pathology from the left axillary lymph node biopsy revealed poorly differentiated adenocarcinoma consistent with lung primary with lymphovascular and extranodal extension (Fig. 6). The left breast skin biopsy demonstrated...
tumor emboli within the dermal lymphatics, and the breast biopsy was also consistent with metastases from a primary lung adenocarcinoma (Fig. 7). These findings are most suggestive of recurrence of her previously treated left lung cancer, perhaps partially attributed to the interruption in her ceritinib treatment.

**Discussion**

The term lung cancer, or bronchogenic carcinoma, refers to malignancies that originate in the airways or pulmonary parenchyma. Approximately 95% of all lung cancers are
classified as either small cell lung cancer or non-small cell lung cancer. Distant metastases from lung cancer most commonly occur in the liver, adrenal glands, bones, and brain.

Metastatic disease to the breast is incredibly rare, with an incidence ranging from 0.2% to approximately 2.7% among reported clinical cases [1,2]. Primary tumors that metastasize to the breast include melanoma, rhabdomyosarcoma, and lung cancers [3]. However, breast metastases from lung cancer remain highly atypical. It can be difficult to differentiate metastasis from a primary lung neoplasm when pathology is consistent with adenocarcinoma, with the potential of misinterpretation as a primary triple-negative breast cancer [4].

Metastases to the breast from extramammary neoplasms may be spread via both lymphatic and hematologic routes [5]. Hematologic metastases typically present with a solitary, well-circumscribed palpable mass that is located in the upper quadrant. In addition, there is no skin or nipple retraction [4].
Fig. 6 – (a) Left axillary lymph node excision revealed metastatic poorly differentiated adenocarcinoma, consistent with lung primary; H&E x10 magnification. (b) TTF1/Napsin A combo immunohistochemistry (IHC) stain x10 magnification, positive stain confirming a lung primary (brown stained cells).

However, with lymphatic metastases to the breast, presentation may be with erythema and swelling of the breast due to infiltration of the dermal lymphatics, with this clinical presentation overlapping that of inflammatory breast cancer. Lymphatic metastases have been described with both ovarian and gastric metastases [5]. While lymphatics metastases from primary lung neoplasm have been reported, this is significantly less common.

As demonstrated in this case, lung adenocarcinoma can metastasize to the ipsilateral breast via lymphatics. In their 2013 report, Huang et al proposed that lung cancer cells may seed the pleura, invade axillary lymph nodes, and metastasize to the ipsilateral breast through retrograde lymphatic vessels [6]. Such patients present with ipsilateral pleural effusion/thickening, axillary lymph node enlargement, and ipsilateral breast metastasis. In this case, our patient was initially treated for presumed pneumonia with a large left pleural effusion, the ipsilateral side where she had previously had her non–small cell lung cancer resected.

In conclusion, it is important to differentiate between extramammary disease with metastatic deposits in the breast from a primary breast neoplasm to prevent a misdiagnosis
Fig. 7 – Left breast skin intradermal lymphatics with tumor emboli; H&E x 20 magnification.

and potential mistreatment. As in this case, the pathologic, histologic, and immunohistochemistry analyses are critical in determining the origin of the malignant cells and formulating a treatment plan [1,7].

Declaration of Competing Interest

None.

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