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CASE REPORT

SOLITARY METASTASIS MASQUERADING AS PRIMARY COLON CARCINOMA ON FDG PET-CT IN A TREATED PATIENT OF BREAST CARCINOMA

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ABSTRACT

Breast cancer is the most common malignancy among women across the globe. Despite receiving treatment, patients may develop recurrence and metastasis. Breast cancer most commonly metastasizes to the bones, lungs, liver, lymph nodes, and brain structures. Metastasis to the gastrointestinal tract is rare, with only a few cases reported in the literature. F18-fluorodeoxyglucose positron emission tomography-computed tomography is performed to localize occult metastasis and suspected recurrence of breast carcinoma that remain undetected in conventional imaging techniques despite rising tumor markers. This case report describes an unusual course of the disease in a patient treated for breast cancer with late presenting colon metastasis mimicking primary colon cancer on fluorodeoxyglucose positron emission tomography-computed tomography. This case demonstrates that fluorodeoxyglucose positron emission tomography-computed tomography can identify the occult metastatic site in patients with breast cancer even at a rare site such as the colon; however, histological evaluation is required to differentiate between breast cancer metastasis to the colon and primary gastrointestinal malignancy.

Keywords: Breast cancer, PET-CT scan, neoplasm metastasis, recurrence

INTRODUCTION

The most common type of cancer amongst women is breast cancer (BCa) and it has recently surpassed lung cancer to become the most common malignant neoplasm overall worldwide (1, 2). The current demographic trend indicates that BCa will pose an even greater public health threat in years to come (3). The most frequently diagnosed type of cancer in women in Pakistan is BCa and one in nine women is at risk of being diagnosed with this morbidity (3). Nearly 12% of patients diagnosed with BCa eventually develop metastatic cancer despite receiving standard treatment including surgery, cytotoxic chemotherapy, radiotherapy, and hormonal treatment (4). Metastasis to common sites such as bones, skin, lungs, liver, and brain is a frequent cause of death and morbidity among BCa patients (1). Although rare, metastasis to the gastrointestinal tract (GIT), spinal cord, and meninges have also been reported (5). Colorectal metastasis may mimic a primary large bowel cancer; however, the metastatic disease should be considered whenever a patient presents with gastrointestinal symptoms such as chronic bowel obstruction, particularly in BCa patients with aggressive tumor biology or receptor-negative diseases (6, 7). Occult metastasis of breast cancer may pose a challenge when serum tumor markers such as CA 15-3 show a rising pattern indicating disease recurrence, and when both clinical examination and conventional imaging modalities fail to identify a site of recurrence or metastatic disease (8).

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Fluorodeoxyglucose labeled with positron emitter fluorine-18 is used for combined positron emission tomography-computed tomography (PET-CT) in the evaluation of oncologic conditions. Studies have shown that FDG PET-CT plays an important role in the detection of locoregional and distant recurrence as well as in monitoring the response to therapy in patients with BCa (6, 9).

This report presents the case of a patient who previously underwent treatment for BCa, and then developed metastasis eight years after completing treatment with chemotherapy. Initially suspected because of a rise in CA 15-3 level, which led to FDG PET-CT detected metastasis to a rare site in the colon mimicking a primary carcinoma.

CASE REPORT

A 45-year-old female was diagnosed with invasive ductal BCa after a lump in the left breast was evaluated in December 2012. After thorough investigation including mammography, ultrasound of breasts, bone scan, and ultrasound of abdomen and pelvis revealed stage IIIA BCa, the patient underwent left mastectomy and nodal dissection in December 2012. Following the operation, the patient received six cycles of adjuvant chemotherapy that included fluorouracil, adriamycin, and cyclophosphamide followed by three-dimensional conformation radiation therapy of the chest wall delivering 50 Gray of radiotherapy. The treatment was completed in October 2013. Since the histology of the surgical specimen demonstrated estrogen receptor positive status, the patient was advised hormonal therapy comprising tamoxifen 20 mg once a day orally. Patient continued to receive oral tamoxifen during the follow-up period of eight years without any significant adverse effects. During the patients' follow-up evaluation in March 2021, CA 15-3 serum level was found to be 40.5 U/mL, which was higher compared to the normal reference range of 30 U/mL. The serum level of CA 15-3 was 61.3 U/mL in October 2021, demonstrating a further rise since March 2021. The patient underwent several procedures for the detection of recurrence including mammography of the right breast, bone scan, chest CT scan, and abdominal and pelvic ultrasonography, but the results did not reveal any evidence of recurrence. FDG PET-CT scan was performed for further evaluation after the patient's consent was taken. FDG PET-CT was conducted after intravenous administration of 315 MBq of FDG followed by a whole body scan using ST Discovery (GE) PET-CT scanner adopting acquisition protocol as per European Association of Nuclear Medicine guidelines. The scan revealed an abnormal focal area of hypermetabolic wall thickening involving hepatic flexure/proximal transverse colon with mild haziness of adjacent omental fat, which was considered significant for primary malignant neoplasm (Figure 1). After informed consent, a colonoscopy was performed, and biopsy specimens were obtained from the diseased site that revealed malignant neoplastic tissue growth. Biopsy report revealed metastatic ductal carcinoma features with 100% estrogen receptor positivity consistent with metastatic BCa to colon (Figure 2).

The authors made an application for a waiver to the institutional review board to share the learning experience with the scientific community. The institutional review board studied the application and the case report, and decided its' unusual findings may increase awareness among the medical community of rare sites of metastasis from BCa that develop years after standard treatment including surgery, chemotherapy, and radiotherapy. The review board found that a waiver in this case would not adversely affect the right and welfare of the concerned patient. Hence, a waiver was granted for this case report.

DISCUSSION

The range of patients presenting with distant metastasis at the time of the first diagnosis, that is de novo metastatic breast

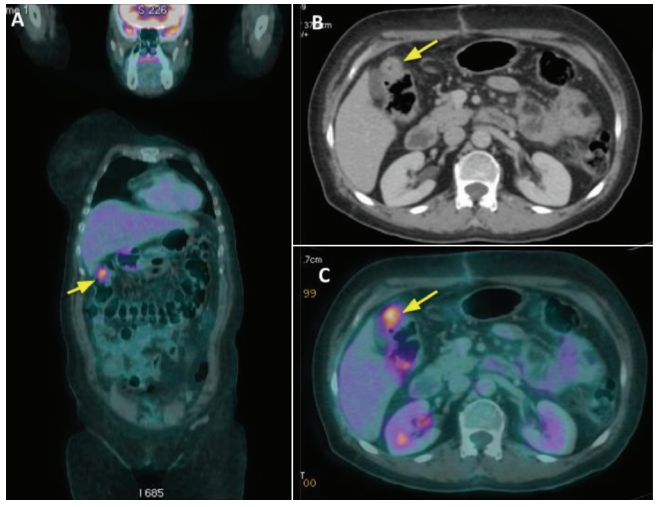

Figure 1: Focal region of increased metabolic activity (yellow arrow) demonstrating standardized uptake value of 8 involving hepatic flexure of colon on fused coronal **(A)** and fused axial **(C)** images of FDG PET-CT. Corresponding axial CT image **(B)** from PET-CT scan demonstrate focal thickening of colon wall (yellow arrow).

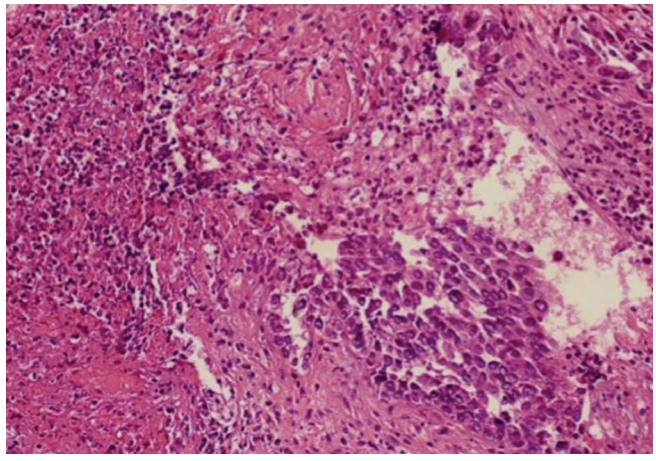

Figure 2: Histological analysis of surgical specimen after biopsy of colon mass that was detected on fluorodeoxyglucose positron emission tomography-computed tomography demonstrated diffuse sheets of ductal differentiation favoring metastatic invasive ductal carcinoma.

cancer, varies from 10-25% in low to middle-income countries to 3-6% in high-income countries (10). However, analogous to our case, a large fraction of patients who are metastasis-free at the time of the first presentation eventually develop distant metastasis despite receiving standard treatment for BCa (11). Although the most common sites for distant metastasis are bones, lungs, liver, and brain, some rare cases of GIT metastasis have been reported in the literature (5). The most frequent organ involved in GIT metastasis is the stomach and involvement of the colon is quite rare (11). Unlike upper GIT metastasis, which often causes symptoms such as vomiting, dysphagia, and abdominal pain earlier in the course of the disease, lower GIT metastasis may remain asymptomatic or produce mild symptoms, which was the case with our patient (12). In a published series, metastasis to colon in primary BCa patients were found in only 20 out of 720 cases (13, 14). Also, Taal et al. (15) have reported 17 cases of colorectal metastasis from BCa over a study period of 15 years. The primary tumor in most of the cases reported by Taal et al. (15) histologically belonged to lobular carcinoma. Unlike our case, the majority of cases with GIT metastasis have been found in patients with lobular type of BCa. Aggressive biology, poor response to standard therapy, and higher propensity of metastasizing to other organs have been identified as possible causes of such behavior of lobular type of BCa (11). Few reports in recently published literature have documented detection of GIT metastasis in BCa patients with invasive ductal carcinoma histology type (16, 17). It is hypothesized that longer survival of patients after effective chemotherapy allows development of metastases in a relatively less aggressive invasive ductal variety of BCa as well. Generally, a mean interval of 53 months after completing primary treatment has been documented among patients who present with GIT metastasis (15). In another study, Schwarz et al. (18) reported 7 cases with metastatic BCa mimicking a GIT primary. The reported average interval in this series was 6 years between diagnosis of BCa and GIT metastasis, and the average survival time after presenting with GI symptoms was 12 months. In our patient, the interval between development of distant metastasis after the completion of primary treatment with chemotherapy and radiotherapy was approximately 9 years. This may be attributed to the suppressive effect of hormonal therapy, as the patient had estrogen receptor positive disease and used oral therapy. It appears from the literature that BCa patients with metastasis to GIT are uncommon, and therefore presence of prior history of malignancy does not necessarily imply GIT metastasis. To differentiate between primary and metastatic tumors involving GIT, histopathological comparison between histological specimens of BCa and GIT features is mandatory. The morphological similarity to the previous BCa and the absence of dysplasia in adjacent colonic epithelium is considered metastatic growth rather than colon primary. Immunohistochemistry analysis also plays an important role in differentiating primary colon carcinoma from GIT metastasis of BCa (11).

FDG PET-CT is not recommended as the primary diagnostic procedure in BCa as the sensitivity of FDG PET-CT ranges between 64-96% and specificity between 73-100% (19). However, it has the potential to be useful for the detection of distant metastases with a reported sensitivity of 80-100% and specificity of 75-100% (20). In another report, the sensitivity and specificity of FDG PET-CT were shown to be better than the sensitivity and specificity of conventional imaging for detecting distant metastatic disease (21). The FDG PET-CT may be particularly useful in patients with biochemical evidence of recurrence or with occult metastasis in whom conventional imaging remains unsuccessful in the detection of the metastatic site.

Local recurrences may be treated by surgery and radiation followed by systemic therapies. The GIT involvement in metastatic BCa represents a systemic disease in which hormonal therapy and chemotherapy, along with surgery, have been reported to produce a favorable response. FDG PET-CT in such cases is considered useful in ascertaining solitary or limited disease and excluding multiple or widespread metastatic deposits.

This case presents an unusual case of colonic metastasis from BCa, and thus adds to the fact that although isolated GIT metastases are very rare, metastatic disease should be taken into consideration whenever a patient demonstrates biochemical evidence of recurrence with or without GIT symptoms. FDG PET-CT localizes solitary colonic the metastatic from BCa accurately; however, histology of the surgical specimen remains the gold standard in differentiating primary colon carcinoma from metastatic deposit of BCa.

Ethics Committee Approval: N/A

Informed Consent: Informed consent was obtained.

Conflict of Interest: The authors declared no conflict of interest.

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