



## Case Report

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# Adenocarcinoma Metastasis to the Breast

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### Abstract

Metastasis to the breast from extramammary tumors is extremely rare accounting for less than 0.5%. Very limited case reports are published with the established diagnosis. Lung carcinomas, gastric carcinomas and melanomas are relatively more frequent primary sites causing the metastasis. Diagnosing metastatic breast cancer can be challenging, a thorough physical examination and a high index of suspicion is required. When deciding upon a management plan, the extent of dissemination and the life expectancy should be taken in consideration. Most of colorectal metastasis to breast carry a poor prognosis, hence palliative care is usually the management of choice. Here we report a case of a 51-year-old female who is a known case of rectosigmoid adenocarcinoma which has metastasized to the breast during the course of her treatment in our institute. Upon diagnosing the patient with breast metastasis palliative treatment was the management of choice. As expected, this patient had a poor prognosis and has died after one year of being diagnosed with the metastatic disease.

### Keywords

Breast Neoplasms; Breast cancer; Colon cancer; Adenocarcinoma; Metastatic tumors

## Introduction

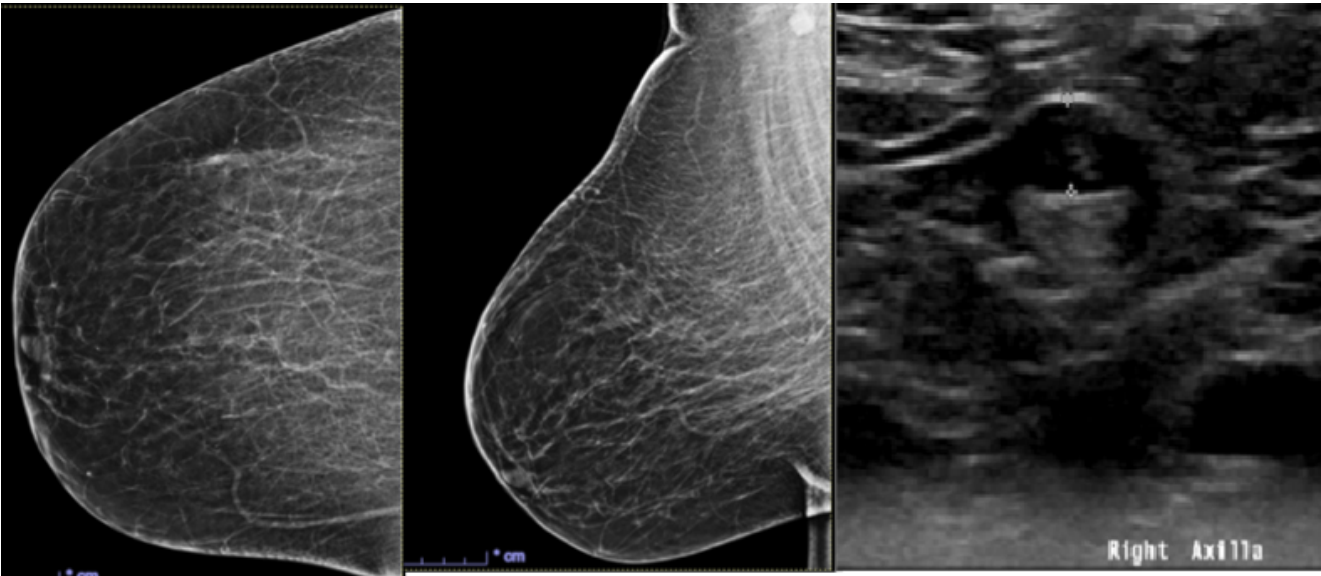
The worldwide incidence of colorectal cancer among women in the year 2020 was estimated to be 865,630 making it the second highest after breast cancer, which was found to have an incidence of more than 2 million as per the WHO international Agency of Research on Cancer [1]. Despite both sites' malignancies being fairly common, they are less likely to be found together and very rarely metastasize to one another [2]. Secondary tumors of the breast are rare, accounting for 1.3%-2.7% [3,4]. The commonest origin of spread in secondary breast cancers is the contralateral breast [2]. Metastasis to the breast from extramammary tumors is extremely rare accounting for less than 0.5% [2]. Lung carcinomas, gastric carcinomas and melanomas are relatively more frequent primary sites [2-5]. Here we report a case of a 51-year-old female who is a known case of rectosigmoid adenocarcinoma which has metastasized to the breast during the course of her treatment in our institute.

## Case Report

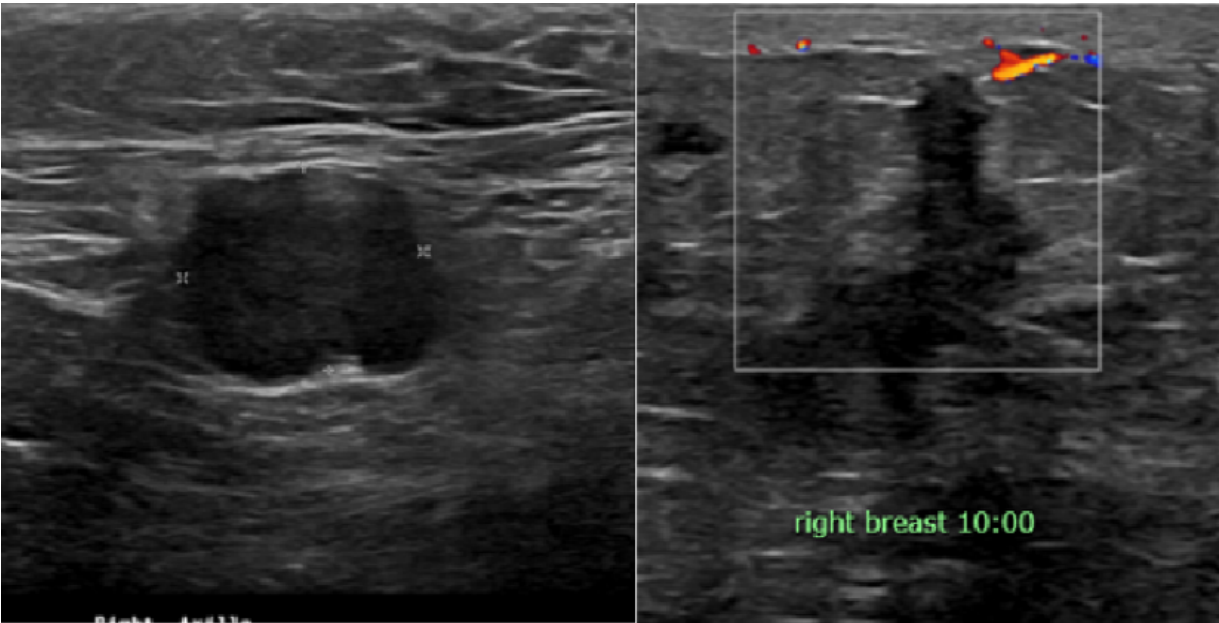
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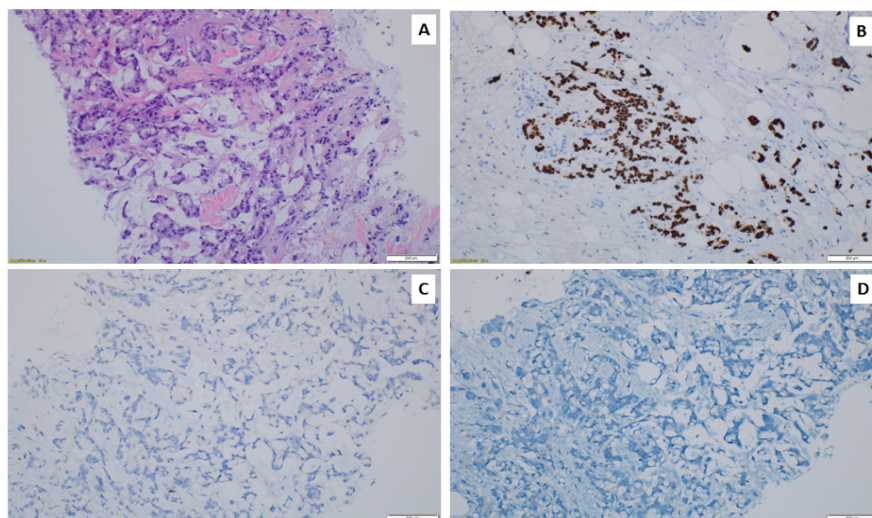
This is a case of a 51-year-old Omani female, with a background of type two diabetes mellitus and hepatitis B infection. She has been diagnosed with a stage IIIC poorly differentiated adenocarcinoma of the rectosigmoid colon in India in 2017. She underwent Hartmann's procedure with hysterectomy and bilateral salpingo-oophorectomy for possible pelvic peritoneal involvement. When presenting to our institute, reports from abroad has shown a pathological staging of T3bN2bMx as the Tumor was found to invade through the muscularis propria to the subserosal fat. Seven out of twelve lymph nodes were found to have malignant invasion. She was not pre-operatively staged abroad and has undergone upfront surgery. In our institute, a staging CT showed post-surgical related changes and no obvious areas of metastasis. A decision was made by the oncologists to start the patient on chemotherapy and radiotherapy (4 cycles of FOLFOX followed by Capecitabine based chemo-radiotherapy followed by 4 cycles of FOLFOX). After four years of treatment, the patient was found to have disease recurrence at the stoma site and the rectal stump, in addition to that, multiple suspicious peritoneal nodules were reported on CT scan. In view of the findings mentioned surgical resection of the site of recurrence, cytoreductive surgery and Hyperthermic Intra-peritoneal Chemotherapy (HIPEC) with Oxaliplatin was carried out for the patient. Three months later, she presented with a generalized swelling of the right breast which has been gradually increasing over a course of one month. On examination, peau d'orange and skin erythema extending from 3 to 8 o'clock was observed in the right breast. However, there were no palpable lumps, no nipple discharge or palpable axillary lymph nodes. Breast Mammogram has resulted as Breast Imaging Reporting and Database system score 4 (BIRAD 4) in the right (affected) breast as there was no breast lesion but a single axillary lymph node with a thick cortex was identified as shown in Figure 1. BIRAD 2 was reported in the Left breast. Breast ultrasound of the affected breast has shown diffuse skin thickening and edema involving the upper outer quadrants of the breast. A suspicious area was found at 10 o'clock in the right breast showing sheets of hypoechoic structures with increase vascularity and hyperemia as described in Figure 2. In addition to that, there were multiple right axillary lymph nodes from level one and two which were found to be thickened in Figure 2. Generally, the ultrasound findings were suggestive of granulomatous mastitis, but considering the patients background, an ultrasound guided true cut biopsy to the right breast mass and an ultrasound guided fine needle aspiration cytology from the right axillary node has been obtained. The biopsy results confirmed primary colon cancer metastasis to the right breast along with necrosis and atypical cells from the right axillary node. Specifically, moderately differentiated adenocarcinoma with a mucinous component were described as seen in Figure 3. After the diagnosis of breast metastasis, the patient has continued the course of her palliative regimen of chemotherapy (FOLFIRI+Cetuximab). Within the course of one year, the patient's general condition has deteriorated. The final staging CT has shown progressive metastatic disease of the lung. A year after diagnosis of breast metastasis, the patient has died after being admitted with progressive respiratory distress.



**Figure 1:** Image 1a and 1b show right mammogram that showed an asymmetrical density in the outer breast that spread out on compression view and the Mediolateral Oblique view (MLO) shows dense lymph node. Image 1c shows right breast ultrasound with diffuse thickening of the anterior cortex which FNAC was taken from.



**Figure 2:** Breast ultrasound done 4 months later. Image 2a shows a diffuse increase in the thickening of an axillary lymph node which is round with irregular borders and loss of fatty hilum. Image 2b shows irregular hypoechoic mass with indistinct borders and surrounding echogenic halo. There is diffuse skin thickening and edema of the breast tissue.



**Figure 3:** A) The breast mass showed tumor tissue. By routine H and E stain, the tumor is a moderately differentiated adenocarcinoma with mucinous component; B) 200x by immunohistochemistry, the tumor cells show diffuse nuclear staining for CDX2; C) 200x the tumor cells are negative for GATA3; D) 200x and combined mammaglobin/GCDPF-15.

## Discussion

Metastasis to the breast from extramammary tumors is extremely rare [2]. Stavros N et.al conducted a study in which a 90 year archive of breast cancer cases was created to find the incidence, presentation and pathology of secondary breast tumors [2]. In the study 14000 patients were included in which only 60 patients were identified and confirmed to have developed secondary nonmammary tumors of the breast, accounting for 0.43% [2]. Within the 60 cases identified, small cell carcinoma of the lung, poorly differentiated adenocarcinoma of the stomach of the signet ring type, renal cell carcinoma, and cutaneous malignant melanoma were the most frequent primary sites [2]. Moreover, the study has identified very unusual sites of metastasis from the retina, pancreas and the thyroid [2]. However, there weren't any colorectal primary cancers identified [2]. Similar patterns have been published in the literature, indicating that although rare, breast metastasis from lung carcinomas, gastric carcinomas and melanomas are relatively more frequent [2,5]. In the context of colorectal cancer metastasis to the breast, a study conducted by Williams et al. stated that 12 out of 169 patients with metastatic breast cancer included in their study had metastasis from the gastrointestinal tract, making it the fourth in line after skin, lung and gynecological cancers in their research [6].

Diagnosing metastatic breast cancer can be challenging, a thorough physical examination and a high index of suspicion is required [6]. The majority of correctly diagnosed breast metastasis cases were initially evaluated clinically in patient presenting with a breast mass [6]. The first published case of metastasis to breast was in 1903 by Trevithick E [7]. The author described a case of a 13-year-old girl with Acute Myeloid Leukemia (AML) who has presented with bilateral breast masses on examination, the breast masses were later identified as extramedullary involvement of AML [7]. After Trevithick, there were multiple authors who have shared their experience with individual cases of breast metastasis. Similarly, the majority of studies and case reports have identified the abnormality through physical examination. It was commonly found to be a unilateral palpable mass;

some studies suggest that the right side may have a higher risk of developing breast cancer metastasis from extramammary tumors [6]. Although our case has presented with a similar fashion, the element of inflammatory skin involvement is not as commonly found in the literature [6]. In the study published by Williams et. al. only up to 1.8% of patients presenting with metastatic breast cancer had inflammatory skin changes [6].

In conjunction with clinical and morphological features, immunohistochemistry remains the most valuable method to confirm the origin of breast lesions [8]. In primary breast cancers Estrogen receptor (ER), Progesterone Receptor (PR) and Epidermal Growth Factor 2 (HER2) are the routinely sought immunohistochemistry markers [8]. Even though ER is commonly found in primary breast cancers, it can also be positive in a range of metastatic gynecologic tumors [9]. If in doubt, markers used to confirm a primary breast cancer lesion are GCDPF15 and GATA3. Factors expressed in Gastrointestinal tract metastatic tumors are CDX2 and CK20 [9]. In our patient, the known clinical background of metastatic disease in combination of pathology result of moderately differentiated adenocarcinoma with a mucinous component from the breast lesion biopsy were sufficient to direct us towards the diagnosis of breast metastasis. Further investigation with immunohistochemistry showed diffuse nuclear staining for CDX2. The majority of opinions in the literature advocate for palliative treatment in metastatic breast cancers [10]. Surgical excision is not recommended as it has not been found to have an impact on the outcome of the condition [10]. In addition to that, surgical interventions were not thought to be the management of choice due to the short life expectancies, patients with breast metastasis were found to have an average life expectancy of 8-10 months [6]. This being stated, there were multiple case reports in the literature in which surgical resection was performed on secondary tumors to the breast [11]. In most of these cases, excision was performed because the breast tumors were mistaken for being primary in origin [11].

## Conclusion

Metastasis to breast from gastrointestinal origins are very rare. Its presentation may be mistaken for a primary breast lesion. To diagnose this rare tumor, it's ought to have a high index of suspicion and an accurate clinical, radiological and histological workup in patient previously diagnosed with a malignancy. When deciding upon a management plan, the extent of dissemination and the life expectancy should be taken in consideration. Most of colorectal metastasis to breast carry a poor prognosis, hence palliative care is usually the management of choice.

## Disclaimer

**Conflict of interest statement:** The authors have no conflicts of interest to declare.

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