

## Metastatic rectal cancer to the breast

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### Abstract

Rectal cancer metastatic to the breast is an exceedingly rare event with around 15 cases reported in the literature. A metastatic breast deposit from the rectum signifies diffuse disseminated disease or a highly aggressive tumor such that surgical intervention other than palliation has a limited role. In the present report, we discuss a patient who presented with rectal cancer and developed a breast metastatic deposit. She soon developed progressive metastatic involvement of the lungs and the soft tissues and succumbed to the malignant course of this disease 12 months after the diagnosis of the primary rectal tumor.

### Introduction

Rectal cancer is expected to affect 40,870 Americans in 2009.<sup>1</sup> Up to 30% of patients with attempted curative surgical intervention will eventually develop regional recurrence.<sup>2</sup> Further, nearly 70% of these patients have local recurrence as well as distant metastases.<sup>3</sup> Nineteen percent of patients newly diagnosed with colorectal cancer present with distant metastasis at the time of diagnosis<sup>4,5</sup> and colorectal cancer patients treated for cure will develop metastatic disease of some form in nearly 40% of cases.<sup>6</sup> Colorectal cancers most typically metastasize to regional lymph nodes. The liver is the most common site of distant metastasis followed by the lungs and bone. Up to one quarter of liver metastases present synchronously, but most commonly liver lesions develop metachronously following treatment of the primary colorectal tumor. Metastases from rectal cancer to multiple organs have been reported either as synchronous lesions or metachronous events.<sup>7-11</sup> In either setting, metastatic disease from the rectum to unusual sites such as the spleen, skin or breast carries a substantially poor prognosis. In the following report, we present a patient with rectal cancer metastatic to the breast whose aggressive tumor led to her demise within a year following the initial diagnosis of rectal cancer.

### Case Report

A 54-year old African American female presented with nausea, vomiting, and abdominal pain. A computed tomography scan of the abdomen and pelvis showed diffuse wall thickening of the small bowel, colon, and rectum with ascites (Figure 1A). An exploratory laparotomy revealed a massive amount of purulent fluid and multiple loculated abscesses as well as a rectal mass. A rigid proctoscopy showed the mass to be 3-4 cm from the anal verge with an obvious perforation. Drains were placed and a diverting colostomy was performed. Pathological evaluation of a surgical specimen taken from the rectum showed an invasive poorly differentiated adenocarcinoma (Figure 2A, B, and C). A CT scan performed two weeks after this operation showed a large heterogeneous soft tissue mass that distended the rectum to 8 cm with no evidence of metastases. She was clinically staged as having cT4NxM0 adenocarcinoma of the rectum. She remained in the hospital for two months due to infectious complications then received preoperative radiation to a dose of 5040 cGy over a period of 44 days. Concurrent chemotherapy was recommended, but not delivered because the patient missed multiple appointments with medical oncology. After the completion of her radiation therapy, however, she did receive three cycles of capecitabine and oxaliplatin with a partial response in the rectum. A total mesorectal excision was planned, but the patient then developed a firm 3 cm mass in the upper outer quadrant of the right breast at 10:00 with a 2 cm firm mobile lymph node in the right axilla. Mammographic examination showed a 3.2 cm indistinctly marginated mass (Figure 1B). An ultrasound of the right breast showed a 3.7 cm hypoechoic, round mass with

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ill-defined margins as well as an oval hypoechoic solid mass measuring 2.4 cm in the right axilla. An ultrasound guided core biopsy of both the right breast mass and the right axillary lymph node showed poorly differentiated invasive adenocarcinoma with no normal breast parenchyma or *in situ* breast carcinoma. When compared to the specimen from the previous rectal mass, the poorly differentiated areas of the rectal biopsy showed a similar morphology to the tumors in the breast and right axilla. Immunostains showed the breast and right axillary tumors to be negative for estrogen receptor, progesterone receptor, Her-2/neu, CK7, mammoglobin, BRST-2, and MUC2, focally positive for monoclonal CEA and CDX2, and positive for MUC1. Fluorescent *in situ* hybridization for Her-2/neu was non-amplified (Figure 3A, B, and C). A repeat computed tomography scan showed new pulmonary nodules. Thus, systemic chemotherapy with capecitabine and oxaliplatin was resumed. After one cycle, she developed a new

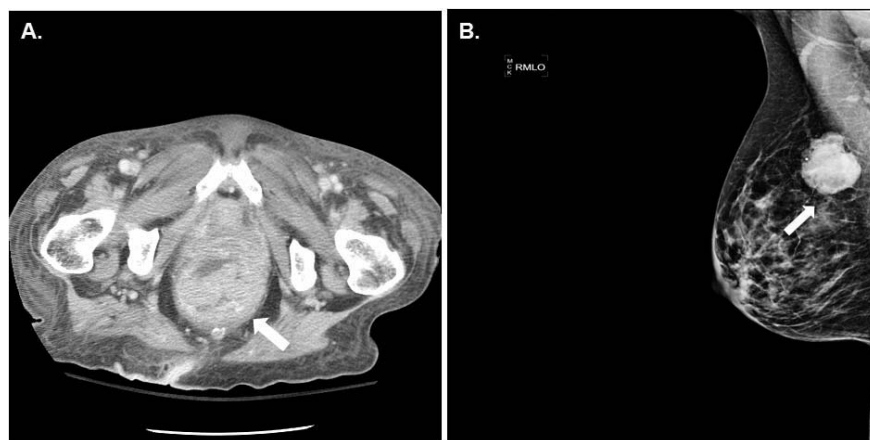


Figure 1. Computed tomography of the abdomen and pelvis. (A) Demonstrated a thickened bowel with a mass in the rectum (arrow). This study was obtained prior to treatment. A mammogram of the breast (B) demonstrated a lesion shown by the arrow.

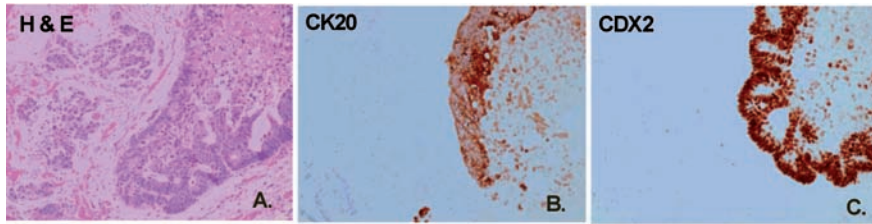


Figure 2. Photomicrograph of rectal mass showing a poorly differentiated adenocarcinoma with focal better-differentiated component (right). (A) Hematoxylin and eosin stain (H&E), x200. (B) Cytokeratin 20 (CK20) immunoreactivity in more differentiated component only, x200; (C) CDX2 immunoreactivity in more differentiated area, x200.

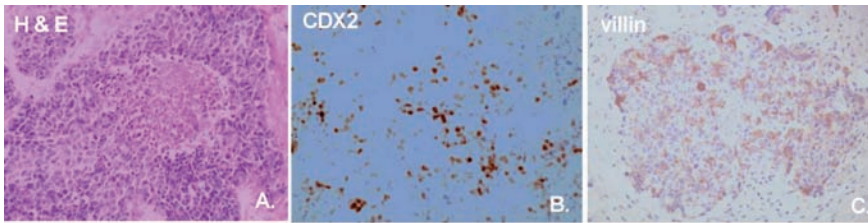


Figure 3. Photomicrograph of breast mass showing morphology and immunoprofile similar to the poorly differentiated adenocarcinoma in the rectum with associated dirty necrosis. (A) Hematoxylin and eosin stain, x200. (B) Focal CDX2 immunoreactivity, x200. (C) Focal villin immunoreactivity, x200.

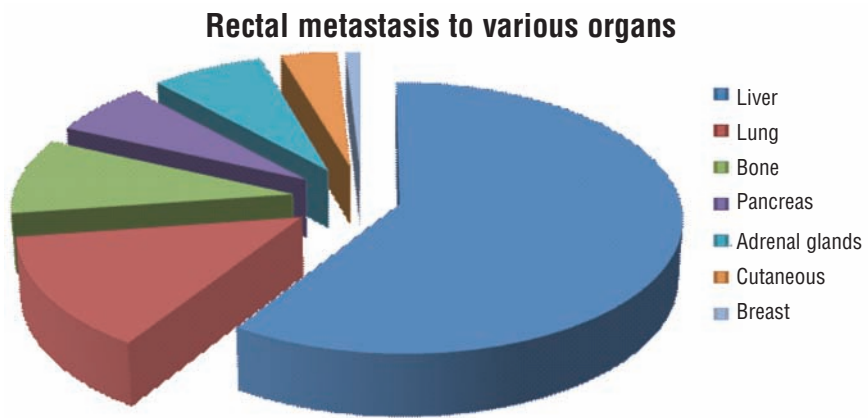


Figure 4. Frequency of rectal metastasis to various organs. The most common sites are the liver and lungs.

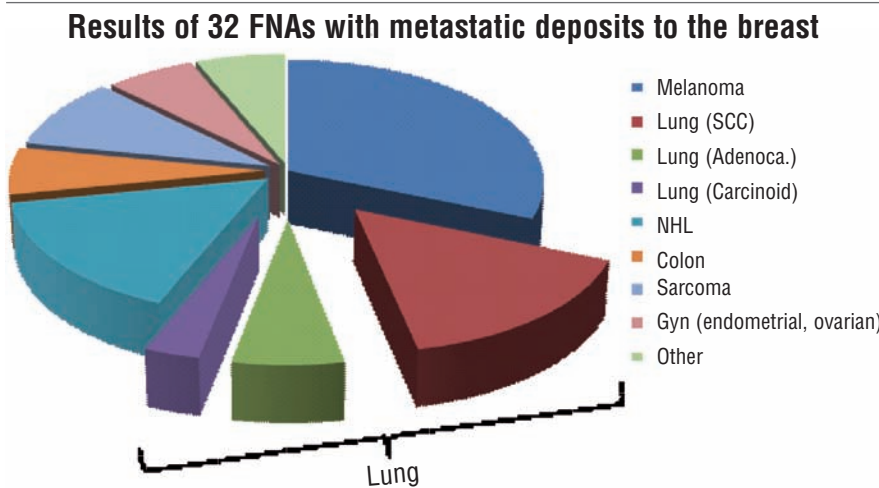


Figure 5. Thirty-two fine needle aspiration specimens with metastatic deposits to the breast in 31 women and 1 man (age 61±3 years old) [range 14-91 years]. The most common origin was cutaneous melanoma.<sup>14</sup>

5 cm soft tissue mass at the level of the skull base that displaced the cervical right internal carotid artery anteriorly, encased the right vertebral artery, and compressed the right internal jugular vein. She received palliative radiation therapy to this area. Unfortunately, she soon developed a new mass adjacent to the primary rectal cancer that caused right hydronephrosis for which she had a right percutaneous nephrostomy tube placed. Two weeks after this insult, she developed a small bowel obstruction. Following aggressive systemic chemotherapy, she was unable to overcome the aggressive metastatic course of the primary tumor and expired one year after her initial diagnosis.

## Discussion

The management of disseminated metastatic colon cancer remains a clinical challenge and surgical intervention has a limited role, typically performed exclusively for palliation. Metastatic spread from rectal cancer occurs both by lymphatic and hematogenous routes. Owing to the venous drainage into the portal system from the superior hemorrhoidal vein, the liver is the most common site of distant metastasis from rectal cancer.<sup>12</sup> Systemic drainage into the inferior vena cava from the inferior hemorrhoidal plexus may lead to metastatic involvement to the lung and bone.

Unusual metastatic lesions from the rectum to the pancreas (~ 7%)<sup>7,8</sup> and adrenal glands have been reported (2-17%).<sup>9</sup> Even more unusual sites of metastasis originating from the rectum have been documented to the skin (<4%)<sup>10</sup> and the breast (Figure 4).<sup>11</sup> Involvement of the skin or breast from rectal cancer signifies disseminated metastatic disease and the prognosis for these patients is exceedingly poor with less than a 20% 1-year survival. The breast is an unusual site for metastatic deposits. The most common metastatic deposit of the breast is the result of a contralateral primary breast carcinoma.<sup>13</sup> Fine needle aspiration will identify extramammary malignancy metastatic to the breast with a range of 0.5-5%.<sup>14</sup> The three most common extra-mammary malignancies are bronchogenic carcinoma, melanoma, and lymphoma.<sup>13-15</sup> A wide array of rare metastatic deposits might also occur with much less frequency and these include: papillary cancer of the ovary, squamous carcinoma (SCC) of the nasal cavity, SCC of the cervix, endometrial adenocarcinoma, gastric cancer, and bladder (Figure 5).<sup>13-15</sup> Extra-mammary metastatic deposits originating from the rectum is an exceedingly rare event. Metastases from the colon to the breast were first reported by McIntosh<sup>16</sup> and from the rectum by Lal in

1999.<sup>17</sup> Around 15 reports of rectal metastases to the breast have been documented since initially described.<sup>11</sup> As in the case in the present report, most patients succumb to the aggressive course of the disease within a year after the diagnosis of the primary tumor. The management of disseminated metastatic rectal cancer remains a clinical and multidisciplinary challenge. In the past, patients would receive systemic chemotherapy until their ultimate demise. However, metastatectomies are becoming increasingly common. Traditionally, metastatectomies have been performed for colorectal liver and lung metastases as this has clearly improved the survival of patients whose primary disease has been controlled.<sup>12,18</sup> Metastatectomies for adrenal<sup>9</sup> and pancreatic tumors<sup>7,8</sup> have also been performed with successful outcomes. However, metastasis to the breast from rectal cancer signifies disseminated metastatic disease or a highly aggressive tumor such that metastatectomies in this setting have a limited role other than palliation. The main form of treatment for these patients is systemic chemotherapy.

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