Primary Rectal Adenocarcinoma Metastasizing to Bilateral Breasts – a Rare Case Demonstrated by ^{18}F -FDG PET/CT

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A 22-year-old female presented with multiple painless bilateral breast masses for the past 2 months. On further questioning, she had hematochezia and constipation for three months. On digital rectal examination, thickening of rectal mucosa at 5 cm from the anal verge was found. On physical examination, multiple firm, non-tender, nodular lesions were found in bilateral breasts. Contrast-enhanced computed tomography (CECT) sagittal, coronal and axial images of the abdomen showed mass-like circumferential wall thickening in the rectum extending to the recto-sigmoid junction, which was suggestive of a primary malignant lesion (Fig. 1a–d, arrows). Sigmoidoscopy showed circumferential growth involving the rectum up to the rectosigmoid junction. Histopathology from the rectal lesion revealed signet ring cell adenocarcinoma. Mammography was performed and the differential diagnoses were primary breast malignancy, bilateral fibroadenoma and metastatic breast disease. ^{18}F -FDG PET/CT was done to determine the extent of the disease. Maximum intensity projection images of FDG PET showed linear diffuse increased FDG uptake involving the rectal region (Fig. 2a, arrow head), multiple areas of increased FDG uptake in the bilateral breast region (Fig. 2a, arrows), and patchy focal areas of increased FDG uptake in multiple dorso-lumbar vertebrae, multiple

bilateral ribs, bilateral scapulae, the humerus, the pelvic bones, the left femur proximal shaft and in the left paravertebral region. Sagittal sections of fused ^{18}F -FDG PET/CT images (Fig. 2b) show subtle lytic changes with increased FDG uptake in multiple cervico-dorsal and lumbar vertebrae and the sternum, and Fig. 2c (arrow) shows circumferential thickening of the rectum with increased FDG uptake. Axial sections of fused PET/CT images (Figs. 2d, e) show multiple FDG-avid soft tissue density lesions involving bilateral breast parenchyma. ^{18}F -FDG PET/CT findings were suggestive of an active primary malignant disease involving the rectum with a metastatic disease involving extensive skeletal sites, bilateral breasts and retroperitoneal lymph nodes.

A biopsy taken of bilateral breast masses showed a malignant tumor comprising of neoplastic cells in sheets with intracellular mucin and eccentrically pushed pleomorphic nuclei (signet ring cells) along with pools of extracellular mucin in hematoxylin and eosin-stained sections (Figs. 3a, b; 40X) which was consistent with metastatic signet ring cell adenocarcinoma to both breasts.

Metastatic breast disease from extramammary primaries is uncommon and it constitutes 0.5–6 % of all breast malignancies [1, 2]. Melanomas, lymphomas, leukemias, and sarcomas are the most common malignancies causing breast metastases. Infrequently, carcinomas of the lung, stomach, ovary, liver, tonsil, pleura, pancreas, cervix, perineum, endometrium, bladder, carcinoid tumors, and renal cell carcinomas can cause metastatic breast disease [3–6]. Bilateral breast metastases are very rare and are reported in few cases of ovarian carcinoma [6]. Rectal adenocarcinoma metastasizing to the breasts is very rare. And bilateral breast metastatic disease from rectal adenocarcinoma is exceedingly uncommon [7, 8]. Only a few cases of colorectal cancer with breast metastases have been reported so far. This will be the youngest and fifth case of bilateral breast metastases from rectal adenocarcinoma [2] and first case demonstrated by

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Fig. 1 Contrast-enhanced abdominal CT images. (a) sagittal, (b) coronal, (c and d) axial images

^{18}F -FDG PET/CT. Metastatic breast disease from colorectal cancer is characterised by disseminated metastatic disease and a poor prognosis [2, 9]. In this case, it was essential to distinguish between metastatic breast disease and primary breast carcinoma

to plan appropriate management. Because of its rare incidence and high index of clinical suspicion, appropriate radiological investigations and histopathology is essential for accurate diagnosis. ^{18}F -FDG PET/CT, being a whole-body metabolic

Fig. 2 ^{18}F -FDG PET/CT images. (a) maximum intensity projection, (b and c) sagittal fusion PET/CT, (d and e) axial fusion PET/CT images

Fig. 3 (a and b) Pathology of the breast masses

functional imaging modality, helped us determine the extent of the primary and metastatic disease. In view of disseminated metastases, the bilateral breast disease was also considered as metastatic involvement, which was proven by histopathology.

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Conflict of interest Ramya Soundararajan, Saurabh Arora, Chandan Jyoti Das, Maitrayee Roy, Rakesh Kumar, and Chandrasekhar Bal declare that they have no conflicts of interest.

Ethical statement The study was approved by an institutional ethics board. The subject in the study gave written informed consent.

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