



Dr. Pushpalatha



CASE REPORT

## Isolated splenic metastases of breast carcinoma detected with <sup>18</sup>F-FDG PET/CT

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### Abstract

18-fluorodeoxyglucose–positron emission tomography integrated with Computed Tomography (<sup>18</sup>F-FDG PET-CT) on staging work up in a case of invasive duct cell carcinoma detected unusual presence of isolated splenic metastases without any other visceral involvement. Following neo adjuvant chemotherapy complete regression of splenic metastases was evident on post therapy scan. This case is being reported because of the rare diagnosis of isolated splenic metastases on PET CT in preoperative staging work up of breast carcinoma.

**Keywords:** Breast carcinoma; <sup>18</sup>F-FDG PET- CT; Chemotherapy; Splenic metastases

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### Introduction

Splenic metastases are unusual which may occur as a part of multi visceral involvement. Among autopsy studies and clinical case series, the most common cancer types (except for lymphoma) that cause splenic metastasis are breast (22.9%), lung (20.2%), colorectal(9.4%), ovary (9%) and stomach (6.9%) [1]. Isolated splenic metastases is still more rare to occur and are reported from colon, ovary, endometrium melanoma, and prostate. Breast carcinoma resulting in isolated splenic metastases is very uncommon and very few case reports are found in the literature so far. We present a case of Invasive duct cell carcinoma of breast in which preoperative <sup>18</sup>F-FDG PET CT showed splenic metastases without any other visceral involvement.

### Case report

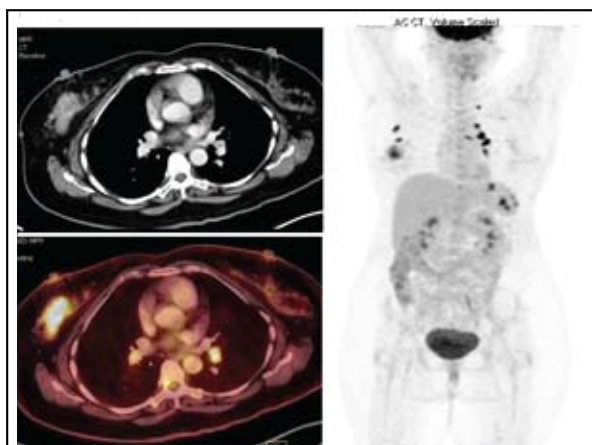
A 54 yrs old female was diagnosed to have invasive duct cell carcinoma of right breast on routine yearly health check up. She was extensively evaluated further for metastatic workup. Ultrasound abdomen & chest radiograph done during health check up

were normal. Patient had a previous history of pulmonary tuberculosis for which she has taken complete treatment. She was treated for viral fever 4 yrs back.

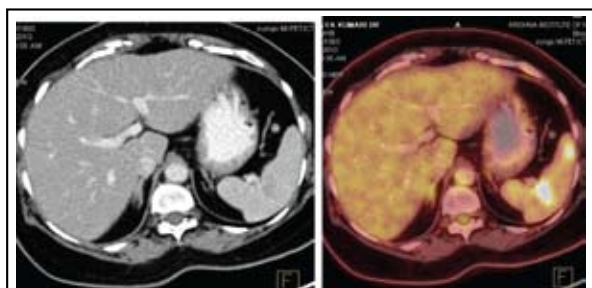
Patient was referred to our department for 18F-FDG PET / CT whole body scan. After 4 hrs of fasting 10 mCi of <sup>18</sup>F-FDG was injected intravenously. Her blood glucose level at the time of injection was 110mg/dl. Serum creatinine was within normal limits. Whole body PET CT was performed after 60 minutes of tracer injection. Whole body PET CT showed the primary right breast mass lesion with high metabolic activity and heterogenous enhancement on CT (Figure 1). Enlarged right axillary and mediastinal nodes are noted with high FDG avidity. Multiple foci of intense tracer uptake are noted in the spleen with corresponding ill defined mild hypo densities on enhancing CT (Figure 2). The Standardized Uptake Value (SUV max) of the lesions is 12. No other abnormal focus is noted in the rest of the whole body. In view of her previous history of pulmonary

tuberculosis, granulomatous disease of spleen was thought of. Further work up for tuberculosis was done Montoux and PCR were negative, ESR was 20mm/ 1st hr. Clinically tuberculosis was ruled out. Hematological work up was normal. Patient deferred the splenic biopsy.

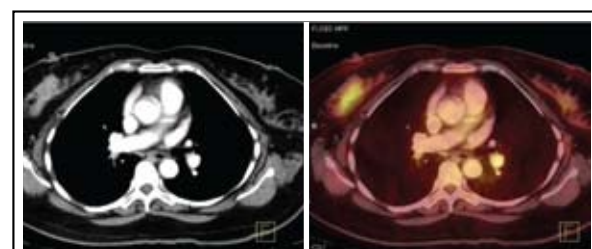
The patient was treated with neoadjuvant chemotherapy on the benefit of doubt for splenic metastases. Four cycles of AC regimen (Adriamycin + cyclophosphamide) were given. Post chemotherapy 18F-FDG PET CT scan was performed after 4 wks of last chemotherapy cycle. All the prerequisites for the scan were followed as in pre therapy scan. The primary tumor in the right breast shows reduction in metabolic activity (Figure 3). There is no evidence of abnormal foci in the spleen consistent with complete metabolic response following chemotherapy (Figure 4). This response confirmed the metastatic involvement of the spleen. The mediastinal and left supraclavicular nodes are partially regressed with reduction in size and activity. The patient was treated further with radical mastectomy followed by adjuvant chemo radiation.



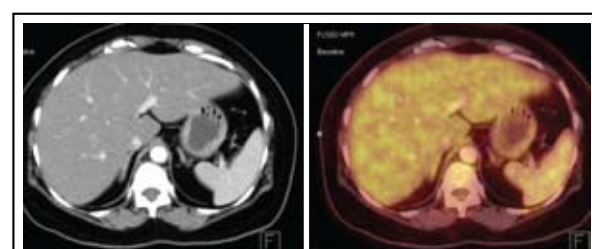
**Figure 1:** <sup>18</sup>F-FDG PET/CT scan showing hypermetabolic primary lesion in the right breast with corresponding heterogenous enhancement on CT. Whole body MIP image showing primary tumor with hypermetabolic right axillary, mediastinal lymph nodes and splenic lesions.



**Figure 2:** Ill defined CT evident Splenic metastases with high metabolic activity on PET.



**Figure 3:** Right breast tumor with reduced metabolic activity following chemotherapy.



**Figure 4:** Complete morphological and metabolic response of splenic metastases following chemotherapy.

## Discussion

Splenic metastases are unusual with incidence of autopsy series ranging from 2.3% to 7.1% [2], incidence in the splenectomized specimens is of 1.1% to 1.3% [3]. The sharp angle of the splenic artery with the celiac axis and the rhythmic contraction

by the sinusoidal splenic architecture, absence of afferent lymphatics and anti tumor activity were contemplated as limiting factors of metastasis [4]. Splenic metastases were found to occur late in the course of the disease as multi visceral involvement through hematogenous or peritoneal spread. Skin Melanomas, carcinomas of breast, lung, colorectal, ovarian and gastric carcinomas are the primaries which metastasize to spleen. Splenic metastases from breast are uncommon with incidence of macroscopically apparent disease in 1-2%, whereas microscopic incidence at postmortem exams is as high as 18 % [5].

Isolated splenic metastases are considered extremely rare which may present in synchronous or metachronous with primary tumor. Comperat et al., who considered a large number of cases, collected 93 cases of isolated splenic metastases available in the literature and showed that isolated splenic metastases are more common in colorectal (21%), ovarian (19%) and lung (11%) cancer, while breast cancer accounted for only 3% [6]. When isolated more than 60% of cases are asymptomatic. Sometimes immune thrombocytopenic purpura may be the presenting feature due to diffuse metastatic infiltration of the spleen by breast carcinoma.

18 - fluorodeoxyglucose - positron emission tomography integrated with Computed Tomography (<sup>18</sup>F-FDG PET- CT) is a functional imaging modality which has an established role in cancer management in the initial diagnosis, staging, restaging and treatment monitoring. It is based on identification of hypermetabolic foci and has been shown to be accurate in staging of lymphoma, lung cancer, melanoma, and gastrointestinal and gynecologic malignancies among other tumors. It is being widely used to diagnose metastatic disease in locally advanced breast carcinomas. NCCN practice guidelines recommend PET CT in stage 3a & 3b breast cancer or if other imaging findings are equivocal or suspicious. A recent meta analysis of the studies showed higher sensitivity of PET CT over conventional imaging (96% vs 56%) in detecting distant metastases from breast carcinoma [7]. FDG PET is useful for staging equivocal nodes, staging N and M when the tumor is T3 or T4, when the primary lesion is medial or superior, or when neoadjuvant therapy is planned without axillary dissection or sentinel node sampling [8].

David Groheux showed that PET CT has changed the clinical stage in 52% of locally advanced inflammatory breast cancer [9]. In their study PET CT outperformed conventional imaging for bone metastases, distant lymph nodes & liver metastases, where as CT was more sensitive for lung metastases. Utilizing PET in preoperative staging changes the clinical stage and helps the clinician towards tailor treatment to the individual needs of each patient.

Splenic metastases are most often incidentally detected by ultrasonography or computed tomography scanning in the follow-up of cancer patients. The increasing use of PET CT has resulted in more patients with asymptomatic metastases being identified than previously found using conventional radiologic techniques. Splenic lesions in patients with a known <sup>18</sup>F-FDG-avid malignancy were accurately dichotomized by PET/CT assessment into benign or malignant [10]. The sensitivity and specificity of visual PET reading for differentiating benign and malignant splenic lesions were 100% using a SUV threshold of 2.3.

Our case reveals a very rare occurrence of isolated splenic metastases in the context of breast cancer and illustrates the role of multimodality functional imaging for the early detection of uncommon metastasis. Isolated splenic metastases from breast carcinoma are very rare and to the best of our Knowledge only five cases have been reported so far in the literature. Ours is the second case where PET CT diagnosed the isolated splenic metastases from breast carcinoma, Iga et al. reported a similar case where the following PET CT diagnosis of lesions, chemotherapy showed the complete regression of the metastases [11].

Advances in imaging techniques such as computed tomography (CT) and F-18 fluorodeoxyglucose (FDG) positron emission tomography (PET) can help identify isolated lesions and result in the provision of more effective local and regional therapies.

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