Metastatic Brachial Plexopathy in a Case of Recurrent Breast Carcinoma Demonstrated on ^{18}F -FDG PET/CT

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This case highlights the importance of recognition of the pattern of metastatic brachialplexopathy in breast cancer patients undergoing ^{18}F -fluorodeoxyglucose (^{18}F -FDG) positron emission tomography/computed tomography (PET/CT) for evaluation of recurrent disease. This pattern can be appreciated on maximum intensity projection (MIP) and coronal ^{18}F -FDG PET/CT images as a linear extension of tracer activity from superomedial aspect (supra/infraclavicular) to lateral aspect of the axilla closely related to the subclavian/axillary vessels).

A 35-year-old woman diagnosed with infiltrating ductal carcinoma of the right breast had undergone six cycles of neoadjuvant chemotherapy, followed by wide local incision and radiotherapy. She had local recurrence, for which she was operated upon and given chemotherapy. She presented to her oncologist with pain and swelling in the right breast, nodules in the right axilla and restriction of movement of the right upper limb. The patient was referred for ^{18}F -FDG PET/CT to evaluate the extent of recurrent/metastatic disease. Whole-body PET/CT was acquired 1 h following the intravenous injection of 296 MBq of ^{18}F -FDG on a Biograph mCT scanner (Siemens). Evaluation of the MIP image revealed abnormal FDG accumulation at multiple sites in the thorax, along with a

linear pattern of FDG uptake in the right lateral aspect of the upper chest (Fig. 1a, *arrow*). The coronal fused PET/CT image revealed a linear pattern of FDG uptake corresponding to an ill-defined mass extending from just behind the right clavicle into the right axilla (*arrow*). In addition, abnormal FDG accumulation was seen in a soft tissue density mass in the upper outer quadrant of the right breast, skin of the right breast laterally, both pectoral muscles (discrete foci) and in a few subpectoral nodes. Soft tissue nodular opacities in both lungs showed FDG accumulation suggestive of pulmonary metastasis (Fig. 1b, *thick arrow*). The patient was referred for magnetic resonance imaging (MRI) to demonstrate the brachial plexus involvement. Coronal diffusion-weighted whole-body imaging with background body signal suppression (DWIBS) revealed a mass in the right axilla, with a *b* value of 1,000, infiltrating the cord and branches of the right brachial plexus visualised as linear hyperintensities (Fig. 1c, *arrow*).

Brachial plexopathy in breast cancer patients can be metastatic (because major lymph drainage routes for the breast course through the axilla) or radiation induced, the former being the commoner of the two [1, 2]. Differentiation between the two pathologies is important for appropriate treatment planning. ^{18}F -FDG PET/CT is a useful tool in the evaluation of patients with recurrent or metastatic breast cancer. Recognition of the pattern of brachial plexus involvement is thus essential for accurate interpretation of the ^{18}F -FDG PET/CT study. To date, two case reports and one small case series [3–5] have demonstrated the feasibility of PET for confirming metastatic brachial plexopathy when MRI was suspicious of the same or when the patient was symptomatic for the same. This case highlights the possibility of metastatic brachial plexopathy even when the patient may not be overtly symptomatic for the same. The typical pattern as seen on MIP and coronal images is linear, extending from the superomedial aspect (supra/infraclavicular) to the lateral aspect of axilla closely related to the subclavian/axillary vessels). The commonest finding on computed tomography (CT) is that of an

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Fig. 1 Whole-body ^{18}F -FDG PET/CT. **a** MIP image. **b** Coronal fused PET/CT image. **c** DWIBS image

axillary mass, but may range from no remarkable abnormality to minimal thickening [2, 6]. Moreover, CT would not be able to differentiate metastatic from radiation plexopathy [2]. MRI is the first-line imaging modality for evaluating brachial plexopathy [7] and can delineate both normal and abnormal anatomy of the brachial plexus, with the ability to differentiate nerves from the surrounding vessels and soft tissue with greater detail than CT [7–10]. In this case, DWIBS was used to demonstrate the presence of a right axillary mass (discrete mass in relation to the plexus), which is the commonest finding on MRI in patients with metastatic plexopathy

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