

Sarcoidosis mimicking metastatic carcinoid on indium-111 pentetreotide scintigraphy

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Carcinoid is a neuroendocrine neoplasm derived from primitive stem cells, occurring most frequently in the alimentary tract. Somatostatin-receptor scintigraphy with indium-111 pentetreotide is a sensitive and noninvasive technique for imaging carcinoid and its metastatic spread. However, nontumoral lesions such as sarcoidosis may also express somatostatin receptors, which may present a diagnostic dilemma in some patients. We present a case of sarcoidosis mimicking metastatic carcinoid on indium-111 pentetreotide scintigraphy in a patient with a history of carcinoid and intra-abdominal metastasis.

Case report

A 42-year-old male with a history of ileocecal carcinoid with metastasis to the liver, diaphragm, and peritoneum presented for evaluation of mediastinal and bilateral hilar lymphadenopathy and pulmonary nodules, demonstrated on a recent followup CT exam of the chest. His past surgical history was significant for right hemicolectomy in 2006, right hepatic lobe resection, partial resection of peritoneal metastasis in 2008, and multiple incisions and drainages due to secondary infection from a retained intra-abdominal foreign body. The patient also had a history of hypertension, asthma, and type A aortic dissection with subsequent repair and aortic valve replacement in 2000. His social history was significant for a five pack-year history of smoking.

Routine hematologic and biochemical profiles revealed an elevated serum serotonin level (281 ng/mL; normal range 26-165 ng/mL), which was the lowest reading since

the patient's diagnosis in 2006. Urine samples demonstrated elevated 5-HIAA (24.1 mg/24 hours; normal range less than or equal to 6 mg/24 hr) and creatinine levels (4.3 g/24 hours; normal range 0.63-2.5 g/24 hours).

Indium-111 pentetreotide scintigraphy demonstrated increased activity within the mediastinum, bilateral hilar regions, and left lower lobe suspicious for metastatic disease (Fig. 1). A fusion fluorine-18 fluorodeoxyglucose positron-emission tomography and computed tomography (18F-FDG PET/CT) exam demonstrated intense hypermetabolic activity in the mediastinum and bilateral hilar regions corresponding to extensive lymphadenopathy. There was also hypermetabolic activity within the bilateral lower lobes corresponding to areas of interstitial thickening bilaterally and airspace consolidation in the left lower lobe (Fig. 2, A-D), which raised suspicion for sarcoidosis as a potential differential diagnosis. Biopsy of a subcarinal lymph-node mass revealed the presence of multiple compact noncaseating granulomas. Characteristic scintigraphic, radiographic, and histopathologic findings confirmed a diagnosis of sarcoidosis.

Discussion

Carcinoid tumor is the most common primary tumor of the small bowel and mesentery. It arises from the endochromaffin cells of Kulchitsky (1). Somatostatin-receptor scintigraphy (SRS) has been demonstrated to provide accurate detection of neuroendocrine tumors; however, nontumoral lesions, such as granulomatous diseases (namely tuberculosis, Wegener's granulomatosis, and sarcoidosis), rheumatoid arthritis, and inflammatory bowel disease, may

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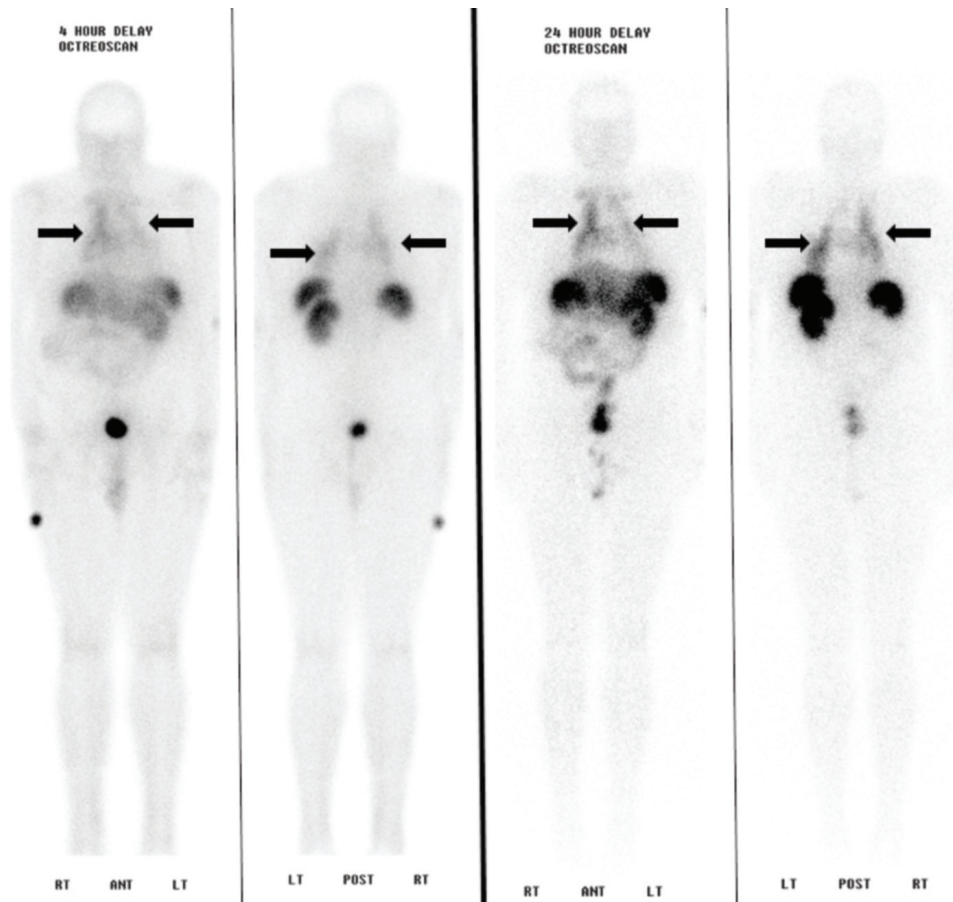


Figure 1. 42-year-old male with sarcoidosis. Indium-111 pentetreotide scintigraphy using whole-body anterior and posterior projections at 4 hours and 24 hours demonstrates multiple foci of increased radiotracer uptake within the mediastinum, bilateral hilar regions, and left lower lung concerning for metastatic carcinoid (arrows). The right kidney is slightly displaced superiorly, which is consistent with patient's history of partial hepatectomy. Normal physiologic activity is present in the liver, kidneys, spleen, bowel, and bladder.

also express somatostatin receptors (2-7). The expression of somatostatin receptors is therefore not specific for tumoral pathologies (3). In our case, active granulomas in sarcoidosis created a false-positive impression of metastatic carcinoid.

Sarcoidosis is a multisystem granulomatous disease of unknown etiology characterized by the histopathologic detection of noncaseating granulomas (8, 9). Imaging findings on high-resolution CT of the chest may demonstrate characteristic nodules in a perivascular distribution and irregular thickening of bronchovascular bundles and interlobular septa (8). Nuclear imaging techniques also play a role in the assessment of patients with sarcoidosis and may demonstrate increased activity on 18F-FDG PET, gallium-67 scintigraphy, and indium-111 pentetreotide scintigraphy. Kaira et al (10) state that the better image quality, the fewer tech-

nical constraints, and the better sensitivity of 18F-FDG PET/CT favor this modality over gallium-67 scintigraphy in the diagnosis and post-treatment assessment of sarcoidosis. In our case, the characteristic radiographic and scintigraphic findings of sarcoidosis were present on 18F-FDG PET/CT and confirmed on biopsy.

In conclusion, while indium-111 pentetreotide scintigraphy is an effective examination for detecting and following neuroendocrine tumors such as carcinoid, nontumoral granulomatous lesions such as sarcoidosis may also express somatostatin receptors and create a diagnostic dilemma in a small number of patients. 18F-FDG PET/CT may help in those cases to differentiate between these two entities, as demonstrated in our case.

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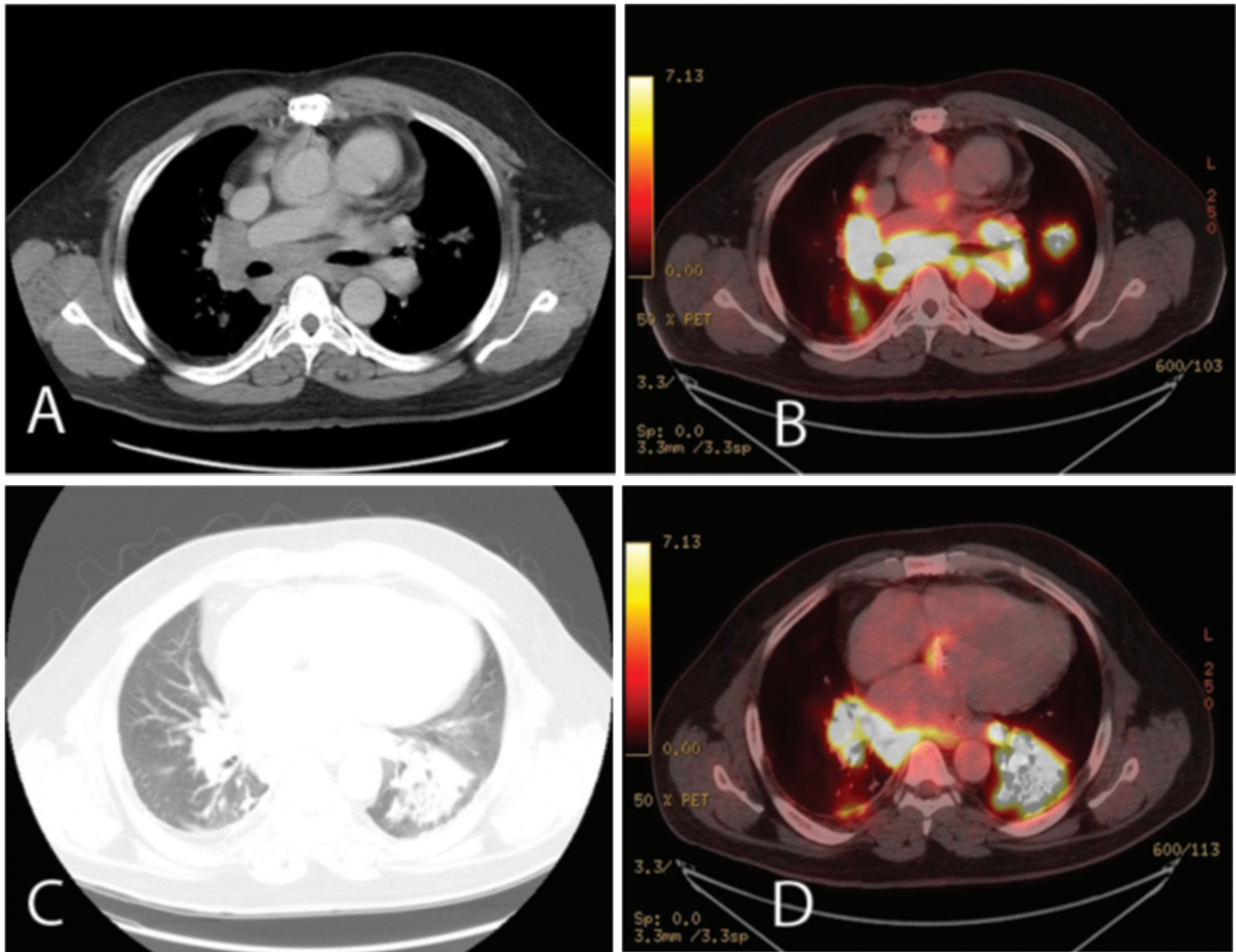


Figure 2. 42-year-old male with sarcoidosis. Select axial ^{18}F -FDG PET/CT images of the chest demonstrate multiple large, hypermetabolic mediastinal and bilateral hilar lymph nodes (A and B). There is also hypermetabolic activity within bilateral lower lobes (D) corresponding to airspace consolidation in the left lower lobe and irregular thickening of bronchovascular bundles. Nodularity along the fissures appears mainly in the right lower lobe (C).

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