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Bronchogenic Squamous Cell Carcinoma Mass with Central Photopenia on FDG-PET Scan

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A 77-year-old man underwent chest imaging with a hybrid fluoro-deoxyglucose (FDG) positron emission tomography (PET)/computed tomography (CT) scan. The study demonstrated a 5 cm mass on standard CT images (figure 1). The FDG-PET images demonstrated a thick-walled mass characterized by intense FDG uptake with a maximum standardized uptake value of 15.9 (figure 2). A large central region of the mass demonstrated photopenia (ie, normal FDG uptake). Volumetric analysis revealed 30% of the mass showed normal FDG uptake, or photophenia. Biopsy of the mass showed squamous cell carcinoma. The findings were consistent with carcinoma that had outgrown its vascular supply resulting in central tumor necrosis.

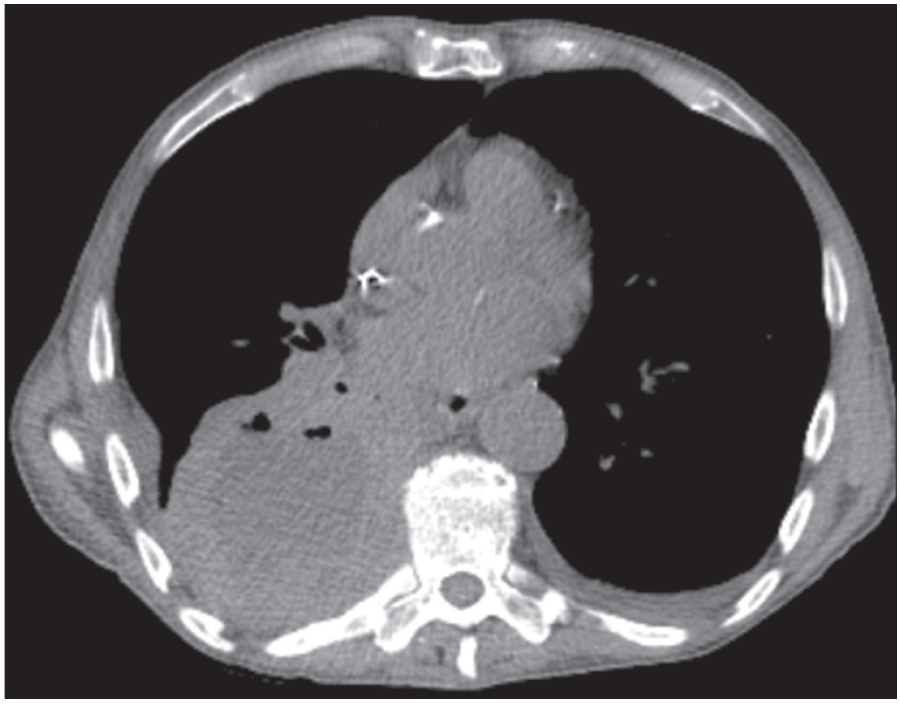

Figure 1. Thoracic computed tomography image showing right lower lobe mass.

Central necrosis is most commonly observed in primary bronchogenic carcinomas of squamous cell origin, with one series reporting squamous cell origin in 82% of cases of necrotizing lung cancer.[1] In an analysis of patterns of FDG uptake in lung cancer based on histologic classification, both large cell and squamous cell carcinomas were significantly more likely to demonstrate central cavitation compared with adenocarcinoma.[2]

The pathogenesis of cavitary malignancies has not been fully elucidated. It has been postulated that cavity formation in tumors is a consequence of rapid tumor growth which exceeds the supporting blood supply resulting in tumor necrosis and

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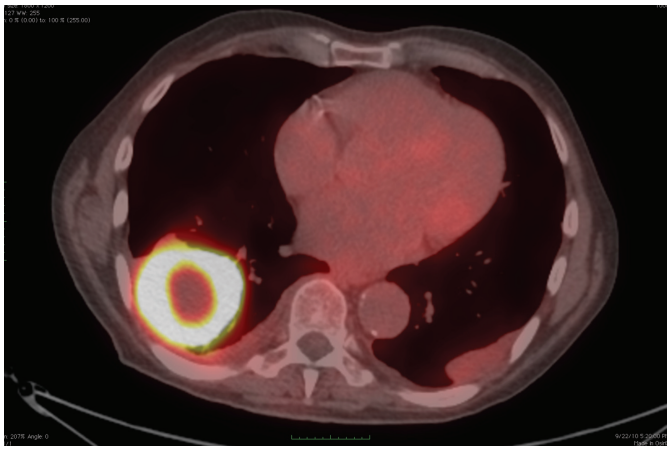

Figure 2. Hybrid fluoro-deoxyglucose (FDG) positron emission tomography/computed tomography image showing a thick-walled mass characterized by FDG uptake with a maximum standardized uptake value of 15.9 in the wall of the mass and central photopenia, consistent with cavitation and central necrosis.

cavitation.[3] This hypothesis is supported by reports that have shown tumor-associated vasculature inhibition by antiangiogenesis agents causing central necrosis and cavity formation in patients with squamous cell carcinoma of the lung.[4, 5]

The development of cavitation may have clinically significant consequences. Cavitating lung tumors may initially simulate an infectious process leading to delayed work up, late diagnosis, and presentation with advanced disease. In previous analyses of patient populations with heterogeneous stages of bronchogenic carcinoma, no difference in survival or response to therapy was found between lung cancers with cavitation and those without cavitation.[1,6] However, in a more recent analysis of 72 patients with stage I non-small cell lung cancer, cavitation within the primary tumor was associated with significantly shorter disease-free survival time and overall survival time.[7] In this analysis, cavitary lesions were significantly more common in squamous cell carcinomas than in adenocarcinomas and in epidermal growth factor receptor (EGFR)-overexpressing tumors than in tumors that did not overexpress EGFR. Accordingly, the presence of cavitation may have therapeutic implications in helping identify patients likely to benefit from targeted treatment with an anti-EGFR agent.

In summary, clinicians should be aware that large bronchogenic carcinomas may develop central cavitation and necrosis, likely resulting from compromised vascular supply, resulting in central photopenia on FDG-PET imaging. This finding may have prognostic and therapeutic implications.

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