Carcinoma of the Lung Misinterpreted as Pulmonary Sequestration on Contrast CT But Correctly Identified on FDG PET/CT

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Abstract: The chest x-ray of a 68-year-old man with a history of cough with blood-tinged sputum showed an abnormality in the right lower lung. Contrast-enhanced CT favored pulmonary sequestration with a feeding artery from the right inferior phrenic artery and a drainage vein into the right pulmonary vein. He had shortness of breath and chest tightness, which prompted an FDG PET/CT study to evaluate the nature of the mass. The images revealed abnormal FDG accumulation in a right lower lung mass and a mediastinal lymph node. Therefore, a possible diagnosis of lung carcinoma with mediastinal lymph node metastasis was suggested. A right lower lobe lobectomy was performed. Histopathologically, squamous cell carcinoma with mediastinal lymph node metastases was diagnosed (stage IIIA by AJCC, T2N2).

Key Words: squamous cell carcinoma, pulmonary sequestration, FDG, PET/CT

REFERENCES
A 68-year-old man complained of cough with blood-tinged sputum for a long time. Recently, he had shortness of breath and chest tightness. Contrast CT of the thorax revealed the arterial supply from both the right pulmonary (arrow) and right inferior phrenic artery (arrow head) and venous drainage into the right inferior pulmonary vein with no obvious interval change as compared with the previous study 1 month ago, which was a pathognomonic feature of pulmonary sequestration. An intralobar sequestration is a congenital bronchopulmonary malformation with no communication with the tracheobronchial tree that is supplied by the systemic arterial circulation and is contiguous with normal lung parenchyma. On CT, it usually presents as a focal opacity and is located most commonly in the posterior basal segment of the lower lobe. The principal objective for diagnosis of pulmonary sequestration is to identify the systemic artery supply. With this information, CT can distinguish sequestration from other causes of lung opacity. We have performed 3-dimensional reconstruction segmentation for a better understanding of the anatomy of the abnormal systemic arteries. Based on these findings, the possibility of pulmonary sequestration was raised.

FIGURE 1. A 68-year-old man complained of cough with blood-tinged sputum for a long time. Recently, he had shortness of breath and chest tightness. Contrast CT of the thorax revealed the arterial supply from both the right pulmonary (arrow) and right inferior phrenic artery (arrow head) and venous drainage into the right inferior pulmonary vein with no obvious interval change as compared with the previous study 1 month ago, which was a pathognomonic feature of pulmonary sequestration. An intralobar sequestration is a congenital bronchopulmonary malformation with no communication with the tracheobronchial tree that is supplied by the systemic arterial circulation and is contiguous with normal lung parenchyma. On CT, it usually presents as a focal opacity and is located most commonly in the posterior basal segment of the lower lobe. The principal objective for diagnosis of pulmonary sequestration is to identify the systemic artery supply. With this information, CT can distinguish sequestration from other causes of lung opacity. We have performed 3-dimensional reconstruction segmentation for a better understanding of the anatomy of the abnormal systemic arteries. Based on these findings, the possibility of pulmonary sequestration was raised.
FIGURE 2. FDG PET/CT was performed after the patient fasted for 6 hours before receiving an intravenous injection of 370 MBq (10 mCi) of FDG. He stayed calmly in the supine position for 1 hour after radionuclide administration. An integrated PET/CT scanner (Biograph, Siemens Medical Solutions) was used to acquire images from the head to the upper part of the thighs. Delayed images of the suspected pulmonary foci were obtained 2 hours after FDG injection. The images were reconstructed with a standard ordered-subset expectation maximization algorithm. The axial spatial resolution was 4 mm at the center of the field of view. For drawing regions of interest, transverse, coronal, sagittal, and maximum-intensity-projection PET and CT images were acquired 1 hour and 2 hours after FDG injection and were displayed simultaneously on a monitor with the same window and level. The CT images were set in the lung window setting. The region of interest was drawn in the midportion of the pulmonary lesion with the highest radioactivity, and its margin was approximately 70% of the maximal radioactivity. PET/CT showed abnormal FDG uptake to a RLL mass (maximum standardized uptake values of 12.37 and 13.99) (arrow) and a mediastinal lymph node (SUVmax of 3.87 [1 hour], 4.95 [2 hours]) (arrow head). Knowing the findings from the PET/CT, lung carcinoma with mediastinal lymph node metastasis was diagnosed. A right lower lobe lobectomy was performed and pathologic examination revealed squamous cell carcinoma (SCC) with mediastinal lymph node metastases.

A previous report concerned FDG PET/CT findings of pulmonary sequestration, in which no abnormal FDG accumulated. Infectious or inflammatory processes in pulmonary sequestration can result in significantly increased FDG activity. FDG PET/CT is generally regarded as being useful in detecting lung cancer with metastases. In our case, SCC and a mediastinal lymph node with higher FDG accumulation in the delayed phase was consistent with the notion that malignancies tend to show higher SUV accumulation in the delayed phase than in the early phase. Like our present case, if the lesions are PET-positive, the surgical resection should be performed.

Our case is interesting in several aspects. First, as a CT scan with contrast medium finds a lung mass supplied by a highly suspicious feeding artery arising from the descending aorta, pulmonary sequestration is generally considered. This case underscores the importance of considering lung cancer as part of the differential diagnosis of a lesion in the posterior basal segment of the lower lobe of the lung. Second, it is well known that a lung nodule and mediastinal lymph nodes have significant FDG uptake on PET/CT and are frequently interpreted as a single type of malignancy with metastases. Third, it has been well published that intralobar sequestration appears as an ill-defined firm area admixed with white and viable tumorous lesions with focal necrosis histopathologically. However, in our case, pathologic findings demonstrate the presence of SCC without sequestration. At surgery, transpleural abdominal systemic artery–pulmonary artery anastomosis from the abdominal systemic artery supply was demonstrated. Systemic-to-pulmonary artery anastomoses exist in many conditions, including congenital abnormalities, acquired states, and postsurgical states. Because the patient had complaints related to the respiratory system for years, infectious or inflammatory processes resulted in anomalous collateral systemic-pulmonary circulation. In conclusion, FDG PET/CT was useful in detecting primary and metastatic lesions of lung cancer which masked as pulmonary sequestration from our presented case.