Squamous Cell Carcinoma Showing Lobar Consolidation without Collapse

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Most squamous cell carcinoma of the lung arises in the large bronchi and causes bronchial obstruction. We report a 74-year-old man with a squamous cell carcinoma of the lung whose roentgenogram revealed a lobar consolidation without collapse. A postmortem examination showed that the tumor cells filled the alveolar spaces completely without destroying the original architecture of the lung. The finding that tumor cells replacing alveolar epithelium, as in bronchioloalveolar cell carcinoma, was not seen throughout the lung. Airway obstruction by the tumor was not observed at any bronchus. These pathological findings seemed to explain the radiological findings.

(Key words: obstructive pneumonia, atelectasis, radiogram, emphysema, indistinct border

Introduction

Bronchogenic carcinoma, with the exception of bronchioloalveolar cell carcinoma, seldom shows pneumonia-like infiltration on chest X-ray. For squamous cell carcinoma, lobar consolidation without collapse is frequently caused by infection distal to the bronchial obstruction in the vast majority of cases (1). We report a case of squamous cell carcinoma with lobar consolidation but without bronchial obstruction, which is very rare roentgenologically and pathologically. The manner of tumor cell extension revealed by the autopsy supported the findings in the patient's X-ray results.

Case Report

A 74-year-old male patient was well until August 1988 after when a cough developed and became increasingly severe. The patient had smoked an average of 30 cigarettes a day for 56 years. He consulted a local physician in December 1988. A radiograph of the chest revealed inhomogeneous consolidation in the right upper lung field which suggested underlying emphysema (2) (Fig. 1-a). The patient was referred to and admitted to our department with a cough, weight loss, and bloody sputa.

A physical examination showed the patient had a barrel-shaped chest, clubbed fingers, and a coarse crackle could be heard over the right upper lung posteriorly. Laboratory findings revealed a calcium level of 11.8 mg/100 ml, parathyroid hormone level of 0.3 ng/ml (normal range <0.5 ng/ml), and calcitonin level of 83 ng/ml (normal range <110 pg/ml). The white blood cell count was 8,600/cu mm and cultures of sputa revealed only normal flora. The patient’s forced expiratory volume in one second was 2,626 ml (132%) and vital capacity was 3,427 ml (112%). The histological diagnosis by sputum cytology and transbronchial lung biopsy (TBLB) was squamous cell carcinoma. The bronchogram of the right lung showed no evidence of bronchial obstruction (Fig. 1-b). A computed tomographic (CT) scan of the chest revealed an incomplete consolidation shadow with spotty air spaces in the right upper lung field, low attenuation areas in the left upper lung (Fig. 2), and a mediastinal lymph node swelling. A 67Ga-citrate scintigram and a 99mTc-methylene diphosphate (MDP) bone scintigram disclosed no distant metastasis except in a lung. The shape and distribution of the shadow suggested the existence of intrabronchial metastasis within the lung. The diagnosis was squamous cell carcinoma of the lung with hypercalcemia in stage IV (T3, N2, M1).

The patient was administered 100 mg of Cisplatin and 8 mg of Vindesine. However, despite this treatment there was no regression of the tumor or hypercalcemia. The second course of the chemotherapy was not considered due to renal dysfunction.

One month after the initiation of the first course of chemotherapy, laboratory findings revealed a calcium level of 16.3
Squamous Cell Cancer with Lobar Consolidation

Fig. 1. a) PA chest roentgenogram revealing inhomogeneous consolidation in the right upper lobe. b) The bronchogram of the right lung which confirmed no bronchial obstruction. There were some cysts at the bronchioles; the lesions were consistent with centrilobular type of emphysema.

Fig. 2. Computed tomographic (CT) scan of the chest showing an inhomogeneous consolidation shadow in the right upper lung field and many low attenuation areas in the left lung.

mg/100 ml, a creatinine level of 1.5 mg/100 ml, and a hemoglobin level of 7.7 g/100 ml. The patient was noted to be somnolent. To correct the hypercalcemia, the patient was administered 40 mg of calcitonin and 30 mg of prednisolone, daily. The patient’s clinical condition improved slightly and the concentration of calcium decreased to 10.3 mg/100 ml.

Two months after the chemotherapy, a chest roentgenogram revealed an increase in the carcinoma size and blunted costophrenic angles. The patient was given irradiation of 750 rad to the involved area of the lung via a three-field technique. Four days after the initiation of the radiotherapy, the therapy was discontinued due to the development of hypoxemia. The patient died on April 26, 1989.

An autopsy revealed a grayish white tumor, 9.0 cm in diameter, in the right upper lobe of the lung (Fig. 3). The center area of the tumor showed necrosis. At the periphery, the tumor had a rather distinct border and did not show any desmoplastic reaction at the interface (Fig. 4). The tumor extended along the bronchus without destroying the parenchymal framework. Airway obstruction by the tumor was not observed at any bronchus. Histologically, this tumor was moderately differentiated squamous cell carcinoma. At the largest part of the mass, tumor cells dominantly extended to fill the alveolar spaces rather than simply lining them (Fig. 5). Immunohistochemical study revealed that this tumor was positive for keratin staining, and a
part of the tumor tissue was positive for carcinoembryonic antigen (CEA), epithelial membrane antigen (EMA), and Alcian blue staining. The remainder of the lung showed centrilobular emphysema with no findings of pneumonia.

**Discussion**

Most squamous cell carcinoma arise in the large bronchi and frequently cause bronchial obstruction; when origination is in the bronchioles, it extends to the lumens and occludes them, even in the early stages (3). The vast majority of radiographic appearances of squamous cell carcinoma are those of obstructive pneumonia and atelectasis.

Occasionally squamous cell carcinomas extend along the parenchymal framework without destroying it as with bronchioloalveolar cell carcinomas, but only to a small extent and at the periphery of the tumor (4-6). Byrd et al. analyzed the radiographic appearances of 263 cases of squamous cell carcinoma of the lung and found 2 cases with homogeneous opacification of a lobe without collapse (7). No roentgenological and pathological findings were shown. Only Hind reported a case of squamous cell carcinoma of the lung who had a lobar infiltration without collapse pathologically (8). In this context, the case of squamous cell carcinoma presented in this report is considered unique both roentgenologically and pathologically, since the peculiar extension of the tumor explained all the patient's roentgenological appearances.

The indistinct border of the peripherally originating squamous cell carcinomas was explained by the desmoplastic reaction at their interface, alveolar-lining tumor permeation, coexisting pneumonia, and pre-existing emphysema (5). As there were neither desmoplastia nor pneumonia in this case, the manner of the tumor expansion itself seemed to make the roentgenological findings characteristic.

There are a few common characteristics seen in this case and that of Hind (8). Both patients were elderly male heavy smokers. Histologically, the remainder of the lung showed emphysematous lesions. Chronic obstructive pulmonary disease (COPD) patients with predominant emphysema tend to develop the peripherally located type of squamous cell carcinoma.
Squamous Cell Cancer with Lobar Consolidation

These carcinomas tend to behave like poorly differentiated adenocarcinoma and large cell carcinoma (10). Immunohistochemical study disclosed that this tumor also might have some characteristics of adenocarcinomas. Pre-existing lesions might be related to the atypical expansion of the tumor cells.

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References