An Autopsy Case of Subacute Cor Pulmonale Due to Pulmonary Tumor Cell Emboli in a Patient with Gastric Cancer

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Abstract

A 53-year-old woman was admitted to our hospital due to a severe respiratory condition and malnutrition. Radiological and electrophysiological findings suggested the existence of inexplicable cor pulmonale. Although we commenced to determine the causes of her severe condition, she suddenly died 3 days after admission. Postmortem autopsy revealed tumor cell microemboli in the small pulmonary arteries due to gastric cancer. Such a case of cor pulmonale as the first clinical manifestation is exceptionally rare. Occult malignancy should be considered as a differential diagnosis when one encounters a patient with subacutely aggravated respiratory condition and inexplicable cor pulmonale.

Key words: cor pulmonale, gastric cancer, pulmonary tumor cell emboli


Introduction

Pulmonary tumor cell emboli (PTCE) are relatively rare clinical manifestations of malignant disease. Furthermore, it is rare that cor pulmonale due to PTCE is identified as the first clinical manifestation. We herein describe a patient with gastric cancer in which subacute cor pulmonale as the first clinical manifestation resulted from PTCE.

Case Report

In February 2003, a previously healthy 53-year-old woman patient developed mild dyspnea and an unproductive cough. She had lost 5 kilograms over the past year and her respiratory condition had become gradually aggravated. She suddenly complained of chest pain and severe dyspnea in March, therefore, was admitted to our hospital due to severe hypoxemia. Physical examination revealed the patient was suffering from acute distress with tachypnea at 24 respirations per minute and tachycardia of 108 beats per minute. Cyanosis was not noted since she was being administered oxygen. Arterial blood gas analysis revealed severe hypoxemia, as PaO2 was 77 Torr under oxygen supplementation of 10 liters per minute with face mask. Malnutrition of the patient was found as a result of laboratory findings (Table 1), which revealed low serum total protein, albumin and cholinesterase levels. Mild anemia, thrombocytopenia and high lactic acid dehydrogenase levels were also discovered, while carcinoembryonic antigen was within normal limits. Even though serum fibrin/fibrinogen degradation products (FDP) were increased, the criterion for disseminated intravascular coagulation was not satisfied. Electrocardiogram revealed sinus tachycardia, complete right bundle branch block and negative T wave from V1 to V4. Echocardiogram revealed dilatation of the right ventricle. Chest X-ray revealed diffuse reticular shadows in both lung fields (Fig. 1). However this

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Table 1. Laboratory Findings on Admission
(The abnormal findings are underlined.)

<table>
<thead>
<tr>
<th>Hematology</th>
<th>Biochemistry</th>
<th>Serology</th>
</tr>
</thead>
<tbody>
<tr>
<td>WBC 6400/mm³</td>
<td>TP 5.1 g/dL</td>
<td>CRP 1.0 mg/dL</td>
</tr>
<tr>
<td>seg 73 %</td>
<td>Alb 2.8 g/dL</td>
<td>Tumor marker</td>
</tr>
<tr>
<td>band 0 %</td>
<td>AST 35 U/L</td>
<td>CEA 3 mg/mL</td>
</tr>
<tr>
<td>eosino 2 %</td>
<td>ALT 38 U/L</td>
<td>Coagulation</td>
</tr>
<tr>
<td>baso 1 %</td>
<td>LDH 587 U/L</td>
<td>PT 11.8 sec.</td>
</tr>
<tr>
<td>lymph 16 %</td>
<td>γ-GTP 31 U/L</td>
<td>APTT 36.1 sec.</td>
</tr>
<tr>
<td>mon 8 %</td>
<td>ChE 149 U/L</td>
<td>FDP 40 μg/mL</td>
</tr>
<tr>
<td>RBC 388x10⁶/mm³</td>
<td>CPK 291 U/L</td>
<td>Fibrinogen 225 mg/dL</td>
</tr>
<tr>
<td>Hb 10.2 g/dL</td>
<td>BUN 14.8 mg/dL</td>
<td>Arterial blood gas analysis</td>
</tr>
<tr>
<td>Ht 31.3 %</td>
<td>Na 141 mEq/L</td>
<td>(10 L/min)</td>
</tr>
<tr>
<td>Plt 12.0x10⁴/mm³</td>
<td>K 4.2 mEq/L</td>
<td>pH 7.455</td>
</tr>
<tr>
<td></td>
<td>Cl 104 mEq/L</td>
<td>PaO₂ 77.0 Torr</td>
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<tr>
<td></td>
<td></td>
<td>PaCO₂ 32.1 Torr</td>
</tr>
<tr>
<td></td>
<td></td>
<td>HCO₃⁻ 22.8 mEq/L</td>
</tr>
<tr>
<td></td>
<td></td>
<td>SaO₂ 96.1 %</td>
</tr>
</tbody>
</table>

Figure 1. Chest X-ray film revealing diffuse reticular shadow in both lung fields.

Figure 2. Thoracic CT revealing diffuse reticular lesions and ground glass opacity in both lung fields.

Figure 3. Thoracic enhanced CT revealing bilateral pleural effusion and dilatation of the right ventricle.

was not a specific abnormality. Thoracic computed tomography (CT) revealed diffuse reticular lesions in both lung fields, and revealed partial ground-glass opacity (Fig. 2). In addition, thoracic enhanced CT revealed bilateral pleural effusion, dilatation of the right ventricle (Fig. 3) and enlarged hilar lymph node although there was no large thrombus identified in the pulmonary artery (Fig. 4). These findings suggested the existence of inexplicable cor pulmonale for this patient. Although a specific diagnosis could not be made, the differential diagnoses based on thoracic CT findings were thought to be as follows; malignant diseases included carcinomatous lymphangiosis, chronic pulmonary thromboembolism, granulomatous diseases and other infectious diseases.

Although we investigated the causes for her severe hypoxemia and cor pulmonale, she suddenly passed away 3 days after admission. Autopsy was immediately performed. Postmortem autopsy disclosed a tumor in the gastric pylorus, which was histopathologically identified as poorly differentiated adenocarcinoma. Metastases were confirmed in the regional lymph nodes, retroperitoneal lymph nodes, mediastinal lymph nodes and lungs. Metastasis to the liver was not confirmed. Large thrombus was not identified in the pul-
Discussion

An autopsy based pathological diagnosis revealed PTCE and carcinomatous lymphangiosis due to gastric cancer. It was discovered that tumor cells and fibrin clots and/or fibrocellular proliferation occluded the lumens of small arteries. Additional pathological findings identified relatively fresh fibrin clots with increased serum FDP. The identification of PTCE and the formation of fibrin clots accompanying PTCE are suggestive of the main cause of death.

In 1990, pulmonary tumor thrombotic microangiopathy (PTTM) characterized by fibrocellular intimal proliferation of small pulmonary arteries and arterioles was reported (1). However, histopathologic examination of the pulmonary specimen did not reveal any fibrocellular intimal proliferation in the present case. Therefore, our case did not satisfy the criterion of PTTM.

Schmidt originally described PTCE (2). Kane and colleagues investigated 1,085 postmortem cases associated with malignant tumor, and described that the incidence of PTCE was approximately 2.4% (3). The common origins of PTCE are breast, stomach, lung, liver and prostate (4, 5), and approximately 7-9% of these cases originated from gastric cancer (3, 4).

As previously described, PTCE are relatively rare clinical manifestations of malignant diseases. Although the most common cause of PTCE is gastric cancer, few reports describe PTCE as the first clinical manifestation of gastric cancer (6-12). Patients with PTCE due to gastric cancer exhibit the following clinical features: 1) relatively young; 2) acute or subacute aggravated respiratory conditions; 3) insignificant abnormalities or any other abnormalities generally not revealed by chest X-ray; 4) small nodular and/or linear lesions occasionally revealed by thoracic CT scan (6-12). It should be emphasized that some are young patients of less than 50 years old (6-10, 12). Indeed, the average age of individuals with PTCE due to gastric cancer was approximately 38.7 years, - with the exception of the case reported by Montero and colleagues (11). Gastric cancer may not be diagnosed until it is in its advanced stages due to its rarity in relatively young patients.

Moreover, these patients generally could not undergo the procedures for the diagnosis such as open lung biopsy or transbronchial lung biopsy due to the severity of their respiratory condition. In fact, the antemortem diagnosis was not established in the present case. A less invasive diagnostic method was reported such as cytological examination of pulmonary arterial wedge samples using Swan-Ganz catheterization (13). Though the prognosis of patients with PTCE is poor, early therapeutic intervention could be provided, if antemortem diagnosis is established. In fact, improvement of survival with chemotherapy in the patients with cor pulmonale due to choriocarcinoma has been reported (14). Therefore, cytological examination of pulmonary arterial wedge may be valuable for diagnosis when it is suspected. Recently, fluorine-18 fluorodeoxyglucose positron emission tomography (FDG PET) has been employed for detection of malignant disease (15). FDG PET sensitivity in detecting gastric cancer is still much lower than in lung, esophageal and colorectal cancer, which are characterized by poor prognosis (15). However, diagnostic strategy was limited due to the serious condition of the patient. FDG PET may be valuable for the patients with PTCE because of its less invasiveness.

Successful treatment with chemotherapy was limited, while thrombolytic agents and anticoagulants have proved to be ineffective (16).

It is rare to encounter such a case where cor pulmonale as
the first clinical manifestation due to PTCE is identified as observed in the present case. PTCE due to malignant tumor, however, should be considered when a physician encounters a patient whose clinical features are similar to our case; severe respiratory condition, malnutrition and inexplicable cor pulmonale. Furthermore, if PTCE are suspected, a cytological examination of the pulmonary arterial wedge and FDG PET should be carried out.

References


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