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Case report

Diffuse cystic lung disease due to pulmonary metastasis of colorectal carcinoma

Mariano Fielli [a], Fabio Avila [a], Agustina Saino [b], Deborah Seimah [b], Marcelo Fernández Casares [a, *]

[a] Pulmonary Section, Department of Internal Medicine, Hospital Nacional Posadas, Buenos Aires, Argentina
[b] Pathology Department, Hospital Nacional Posadas, Buenos Aires, Argentina

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ABSTRACT

The diffuse cystic lung diseases (DCLDs) are a pathophysiologically heterogeneous processes characterized by the presence of multiple thin-walled, air-filled spaces within the pulmonary parenchyma. The most common causes of DCLD are lymphangioleiomyomatosis (LAM) and pulmonary Langerhans cell histiocytosis (PLCH).

DCLD develops rarely as a result of malignancy, typically secondary to metastases from peripheral sarcomas and mesenchymal tumors. DCLD have also been reported in a variety of other metastatic disease such as adenocarcinoma.

Our case describes a patient with DCLD as a result of metastatic colorectal adenocarcinoma.

1. Introduction

The diffuse cystic lung diseases (DCLD) are a group of entities characterized by the presence of cysts in both lungs that are not necessarily evenly distributed. The differential diagnosis is limited and typically includes lymphangioleiomyomatosis (LAM) and pulmonary Langerhans cell histiocytosis (PLCH) [1]. Rarely, metastatic malignancy can present as DCLD. Metastatic leiomyoma, endometrial stromal sarcoma and cellular fibrous histiocytic tumors have been reported as causes of lung cysts [2,3].

2. Case

A 49-year-old man was referred to our hospital with progressively worsening shortness of breath, dry cough and weight loss of approximately 10 kg. Three weeks prior to admission, the patient had presented to another hospital and was treated with antibiotics without improvement.

His past medical history was remarkable for tobacco addiction and alcohol abuse. He also had used cocaine up to 2 years before presentation. He did not report having any kind of environmental exposures or pets.

On admission, his blood pressure was 140/80 mmHg. His temperature was 38 °C, and auscultation of his chest revealed diminished breath sounds and wheezing. The oxygen saturation (SpO2) was 98% on room air.

Notable laboratory findings included the following: a white blood cell count of 13,000/mL, a platelet count of 439,000/mL, and a hemoglobin of 16.7 g/dL. HIV serology, antinuclear antibody (ANA) and anti-neutrophil cytoplasmic antibody (ANCA) were negative. The prostate-specific antigen (PSA) level was lower than 4.0 ng/mL.

Pulmonary function tests revealed a severe non-obstructive defect, and a chest CT scan showed multiple lung cysts that predominated in the lower lobes (Fig. 1). A bronchoscopy was performed, and no endoluminal or mucosal lesions were observed. A bronchoalveolar lavage (BAL) culture was negative for bacterial infection, Mycobacterium tuberculosis (and nontuberculous mycobacteria) infection and fungal infection. The cytological examination did not find atypia, and CD1a immunostaining of the BAL cells was also negative.

The patient was treated with intravenous broad spectrum antibiotics and steroids for 14 days, showing moderate improvement of his respiratory symptoms. He was discharged from the hospital and readmitted three weeks later with dyspnea and productive

* Corresponding author. Hospital Nacional Posadas, Illia and Marconi, El Palomar, Buenos Aires, 1684, Argentina.
E-mail addresses: mhfielli@gmail.com (M. Fielli), fabioaviladth@gmail.com (F. Avila), agustinasaino@gmail.com (A. Saino), deborah_seimah@hotmail.com (D. Seimah), mfercasar@intramed.net.ar (M. Fernández Casares).

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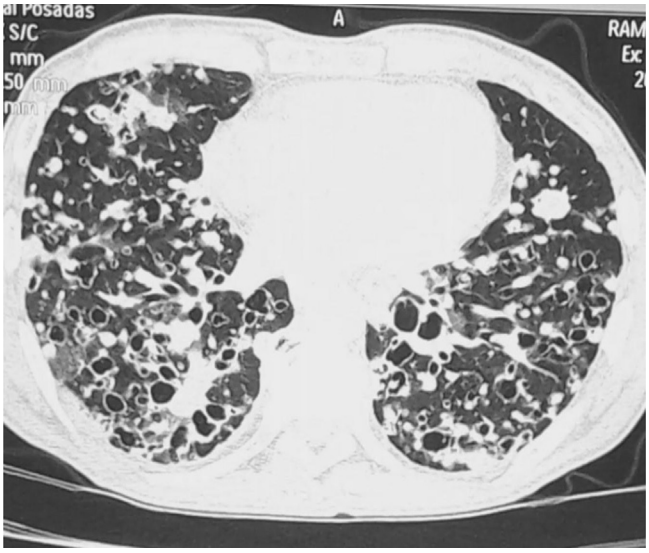

Fig. 1. High resolution CT showing multiple cysts, which markedly vary in size, in the lower lobes and nodules that tend to cavitation.

cough with purulent sputum.

He was alert, tachycardic and tachypneic. Chest auscultation revealed diminished breath sounds and bilateral wheezing. The SpO2 was 85% on room air.

Laboratory findings included the following: a white blood cell count of 41,500/mL, a blood glucose of 331 mg/dL, and a C reactive protein (CRP) level of 13.9 mg/dL.

A new chest CT scan demonstrated an increased number of cysts (some of which were filled with mucus), bilateral ground glass opacities and consolidation.

A diagnosis of nosocomial pneumonia was made. The patient was started on antibiotic therapy with vancomycin and piperacillin-tazobactam, but his clinical condition deteriorated rapidly. He was intubated and mechanically ventilated. A second bronchoscopy was performed, and transbronchial biopsies were obtained.

The biopsy specimen revealed a small fragment of lung parenchyma infiltrated by large cells, some of which had prominent nucleoli and eosinophilic cytoplasm, showing gland formation areas and focal necrosis. The tumor cells were CK-20-positive, villin-positive, CK7-negative and TTF1-negative. The patient was diagnosed with metastatic colorectal cancer.

The patient died on the 4th day after admission.

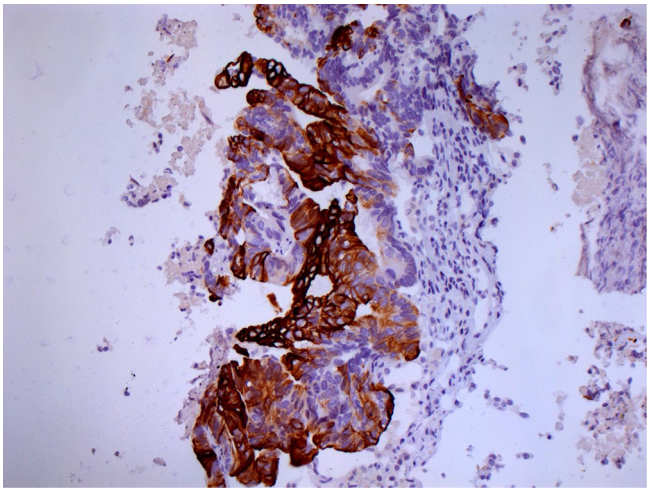

Fig. 3. CK20: diffuse and strong positivity of tumor cells with CK20.

3. Discussion

A lung cyst is defined as an abnormal space that could be filled with air or liquid. It has a thin wall that is covered by epithelium. From a radiological point of view, a lung cyst is a rounded radiolucent or low attenuation formation of variable size with well-defined edges and a wall of less than 3 mm that separates it from the normal lung parenchyma [4].

The differential diagnosis of patients with lung cysts is large because many congenital or acquired diseases can be responsible for their presence. An important distinction is whether they are focal or multifocal or if they are scattered diffusely throughout both lungs, which is termed “diffuse cystic lung disease” (DCLD). In this

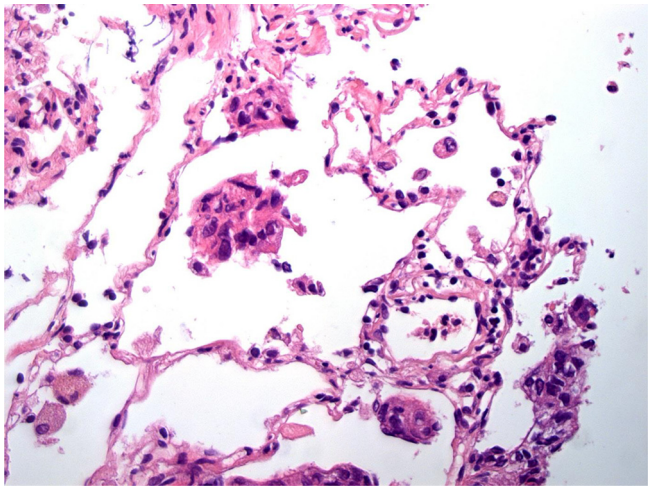

Fig. 2. H & E: pulmonary parenchyma infiltrated by well-differentiated adenocarcinoma with small foci of necrosis.

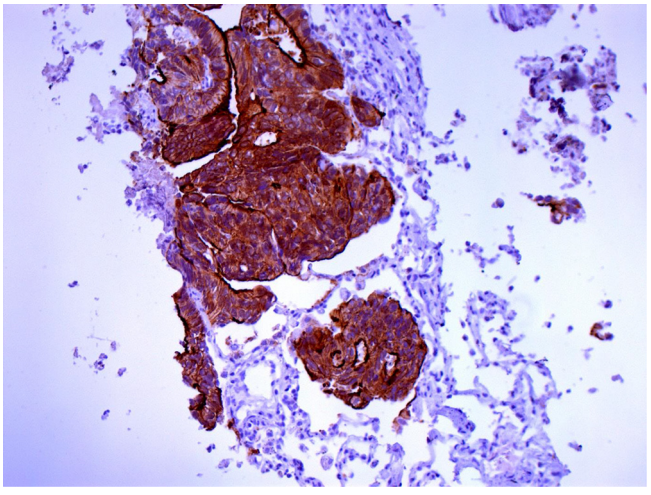

Fig. 4. Villin: cytoplasmic positivity of the tumor cells and brush border accent with villin.

case, the differential diagnosis usually includes two rare entities, LAM and PLCH [5]. Infrequently DCLD can develop as a result of metastatic malignancies such as sarcomas, mesenchymal tumors or lung adenocarcinoma [6–10].

It is important to distinguish a cyst from a cavity, which is an air containing lesion with thickened and irregular walls due to central necrosis. Cavities are relatively common in malignant lesions of the lung [11].

Three mechanisms of cyst formation in metastatic lung disease have been postulated as follows: central necrosis, infiltration by malignant cells of preexisting bullae or small airway distension through a valve effect caused by atypical cell infiltration [7,12].

The absence of a solid tumor often introduces difficulties in histopathological diagnosis, requiring the aid of immunohistochemical staining with monoclonal antibodies to tumor markers.

In our patient, lung adenocarcinoma was first considered because of his tobacco addiction and the presence of gland formation areas in the histopathological examination of his lung tissue (Fig. 2). The absence of cytokeratin 7 (CK 7) and thyroid transcription factor 1 (TTF-1) immunostaining excluded lung cancer; thus, a metastatic adenocarcinoma of unknown origin was considered. A second panel of antibodies was positive for cytokeratin 20 (CK 20) (Fig. 3) and villin (Fig. 4), resulting in a diagnosis of colorectal cancer [13,14].

The patient presented to the emergency department with shortness of breath, weight loss and multiple lung cysts, which turned out to be metastatic colorectal cancer. The absence of liver metastases was noteworthy. The liver is usually the first organ affected by metastatic colon cancer. However, the blood coming from the rectum returns to the heart through the vena cava, bypassing the liver. Thus, rectal cancer patients have a much higher incidence of pulmonary metastases than those with colon cancer [15].

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