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"An unusual case of diffuse cystic lung disease: A teenager with lung metastasis"

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Abstract

We are presenting a teenage girl with a recent history of virilism who presented with tension pneumothorax. Subsequent contrast-enhanced chest CT revealed multiple bilateral irregular thin-walled cysts of varying sizes with numerous solid noncalcified pulmonary nodules and pulmonary artery pseudoaneurysms. Lung biopsy revealed trophoblastic neoplasm with metastasis to both lungs. We discussed the differential diagnosis of diffuse cystic lung diseases. While diffuse cystic lung diseases in children are rarely due to malignancy, we emphasize that clinicians be aware of the possibility of metastatic lung diseases and their radiologic features when encountering diffuse cystic lung diseases.

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Short title: "Metastatic lung disease with multiple cystic lesions"

To the Editor,

A 13-year-old girl with a history of virilism for six months presented with acute onset chest pain and shortness of breath to the emergency room. Chest-X ray showed a large left tension pneumothorax (Figure 1), and an emergent chest tube was placed. Subsequent contrast-enhanced chest CT (Figure 2) revealed multiple bilateral irregular thin-walled cysts of varying sizes with numerous solid noncalcified pulmonary nodules and pulmonary artery pseudoaneurysms (PAPAs). Abdominal CT identified a heterogeneously enhancing solid-appearing mass-like structure in the right adnexal region. Further imaging workup with transabdominal pelvic ultrasound and contrast-enhance pelvic MRI showed an enlarged right ovary with an area of central heterogeneity but without a discrete mass or lesion (Figure 3).

On clinical examination, signs of virilism were noted. A multidisciplinary investigation revealed a normal hepatic function panel, elevated beta HCG (194 IU/L), elevated total testosterone (413 ng/dL), elevated serum free testosterone level (7.09 ng/dL), elevated androstenedione level (556 ng/dL), normal LH, FSH, normal estradiol and antimullerian hormone levels. Ovarian venous sampling revealed bilaterally increased beta HCG (181 mIU/mL) and testosterone levels (>7000 ng/dL).

CA-19-9 (42U/mL) and CA-125 (46 U/mL) were also elevated; AFP was normal.

A fluorodeoxyglucose-positron emission tomography (FDG-PET) showed no occult malignancy or increased radiotracer uptake in the lungs or the adnexa. Lung biopsy revealed trophoblastic neoplasm with metastasis to both lungs. She underwent laparoscopic right salpingo-oophorectomy, coil embolization of the largest pulmonary pseudoaneurysms (Figure 4) bilaterally, and chemotherapy was initiated.

Diffuse cystic lung diseases (DCLDs) are a heterogeneous group of pulmonary disorders characterized by multiple air-filled spaces, or cysts, within the lung parenchyma. Cysts are thin-walled (2 mm wall thickness), spherical, air-filled lucencies interfaced with normal lung tissue [1]. In adults, DCLD can occur with lymphangioleiomyomatosis (LAM), Langerhans cell histiocytosis, lymphocytic interstitial pneumonia, Birt-Hogg-Dubé syndrome, primary and metastatic cancers, and amyloidosis [2]. DCLD in children is frequently associated with lung development and growth abnormalities. The most frequent cause of DCLD is bronchopulmonary dysplasia, and lesions are usually bilateral. Congenital pulmonary airway malformation can also present as DCLD, but more frequently, it is focal [3]. Other rare congenital causes of DCLD include congenital lobar emphysema, congenital bulla, congenital bronchiectasis, and bronchial atresia [3]. Blunt trauma to the chest can also lead to cysts known as post-traumatic pseudocysts or pneumatoceles. Infections such as Pneumocystis jirovecii or Staphylococcus aureus may cause DCLD with pneumatoceles [4]. Recurrent respiratory papillomatosis can rarely present with DCLD. Other rare causes of DCLD in children include Birt-Hogg-Dubé syndrome and LAM. Birt-Hogg- Dubé syndrome is a rare, autosomal-dominant disorder characterized by the development of hair follicle tumors, renal neoplasms, and pulmonary cysts. LAM is caused by lung infiltration with smooth muscle cells that arise from an unknown source, spread via blood and lymphatics, and contain growth-activating mutations in tuberous sclerosis genes[2, 3].

Individuals with pulmonary cysts are generally asymptomatic or have mild nonspecific symptoms (mild cough, dyspnea) and are discovered incidentally on chest imaging. A small part of patients may present

with pneumothorax [2]. In children, DCLD rarely develops due to a malignant process, typically secondary to metastases from peripheral sarcomas and mesenchymal tumors [4]. Pleuropulmonary blastoma is the most common primary pediatric lung neoplasm; it typically presents in children under six years of age and can manifest as a multilocular cystic neoplasm [4].

PAPAs may be congenital or acquired, with infections being the most common cause of the acquired form; pyogenic bacteria, such as Staphylococcus aureus and Streptococcus pyogenes, are commonly implicated. Massive hemoptysis is a fatal complication of ruptured PAPAs[5].

In summary, DCLD is rare in children and has multiple etiologies. We present a case of DCLD caused by metastatic lung disease and, to the best of our knowledge, the first case of a lung metastatic trophoblastic tumor in a child. Even though it is rare, clinicians should be aware of the possibility of metastatic lung diseases as the cause of DCLD.

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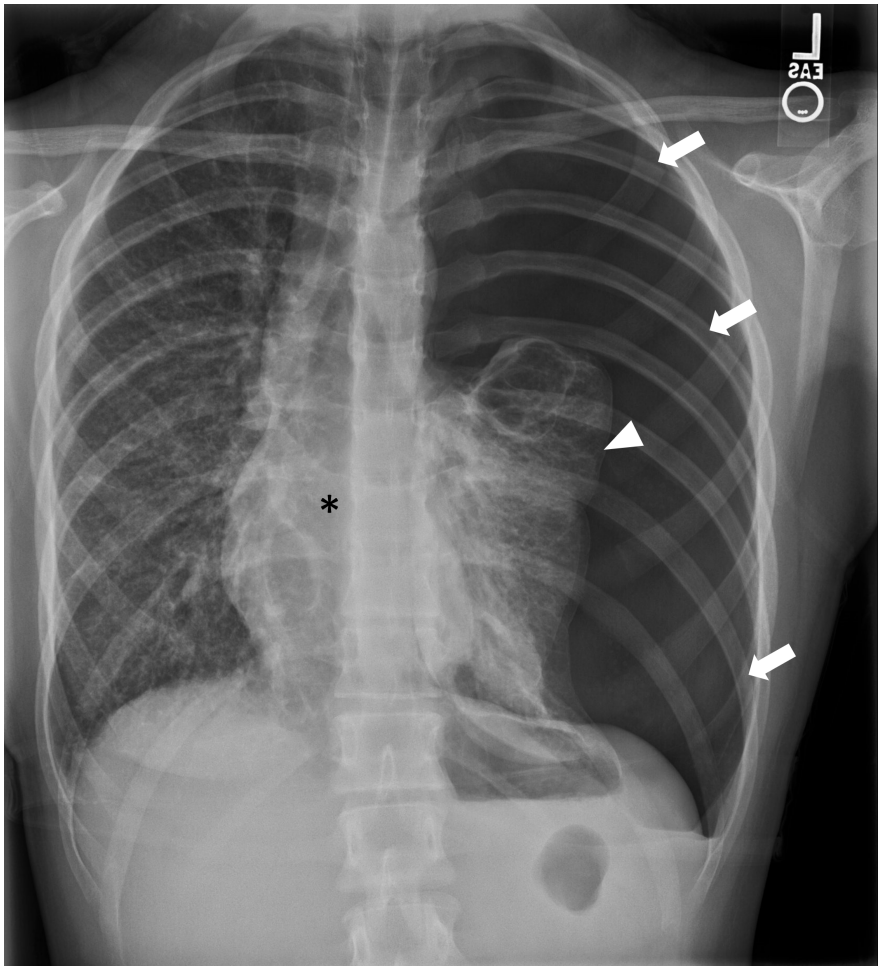

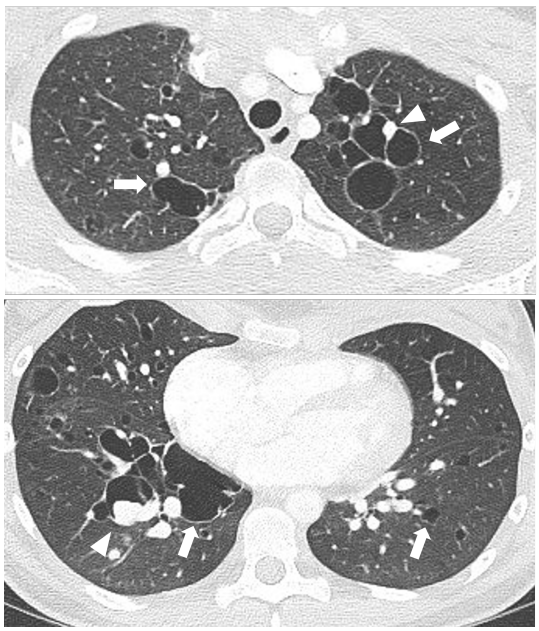

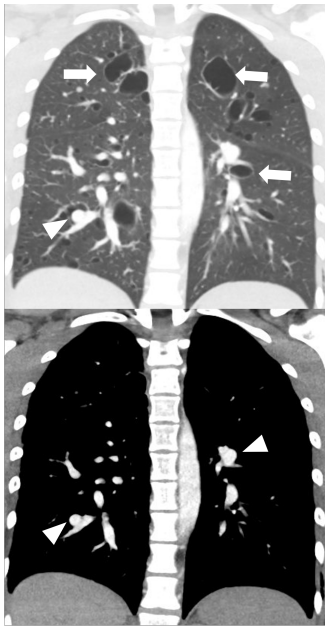

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