Asymptomatic Pulmonary Cyst in a College Student*

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A 19-year-old college student was referred for evaluation of an abnormal chest roentgenogram. She had presented to an outside hospital with recurrent tonsillitis and was scheduled for an elective tonsillectomy. A chest x-ray film was obtained before admission, and an abnormality was noted. The tonsillectomy was deferred while a second opinion was obtained.

The patient felt well and specifically denied fever, chills, chest pain, sputum production, hemoptysis, or previous episodes of pneumonia. She had no known exposure to tuberculosis and no prior history of surgery. She was receiving no medications and did not smoke. At the time of presentation, she was a sophomore in college and regularly enjoyed aerobics. There was no history of travel outside the United States.

The findings from physical examination were completely unremarkable. The chest x-ray film showed a well-circumscribed right upper lobe cystic structure (Fig 1), and the CT scan showed an homogeneous mass (Hounsfield number of 30) with an apparent rind (Fig 2). Laboratory studies were unrevealing, with a normal white blood cell count and differential cell count. The mass remained unchanged during four months of follow-up, and subsequently the patient was admitted for thoracotomy.

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**Diagnosis: Echinococcal cyst of the lung**

Upon opening the chest, the thoracic surgeons encountered a well-circumscribed cyst which arose from the inferior aspect of the right upper lobe posterior segment and was easily dissected free of the surrounding parenchyma. Pathologic analysis showed a 7 x 4-cm hydatid cyst with a rind and numerous scoleces within the structure (Fig 3). The patient recovered uneventfully. A postoperative CT scan of the liver showed no abnormalities, and the patient has done well since discharge.

Hydatid disease is caused by the larval stage of the parasites, *Echinococcus granulosus* and *E aleoelaris*, members of the class, Cestoda (tapeworms), for which the dog or other carnivore (wolf; coyote; arctic fox) is the definitive host. The worm lives in the small intestine of the definitive host, and ova are passed onto pastures, where sheep, cattle, or other herbivores may be grazing. These animals and, occasionally, man ingest the ovum which, after dissolution of its chitinous coat in the stomach, develops into a larva in the duodenum. The hatched embryo then passes through the duodenal wall into either a mesenteric venule or the periduodenal and perigastric lymphatic vessels and subsequently lodges in the liver, lung, or other tissue. Once it has reached its destination, the embryo transforms into a hydatid, having a mother cyst wall and many protoscoleces that are derived from a germinal membrane.

Pulmonary cysts may develop secondary to hepatic lesions (via direct extension or fistulae) or may occur in the absence of hepatic lesions from connections between the periduodenal and perigastric lymphatic vessels to the thoracomediastinal lymphatic vessels and the thoracic duct. A more direct but probably uncommon route of infection in pulmonary hydatidosis is through inhalation of air particles containing dried microfragments of animal excreta carrying echinococci. Overall, the liver is the most common site, followed by the lung. If larvae penetrate these areas, they may reach the spleen, kidneys, brain, and skeleton.

There are two common types of hydatid disease; the pastoral variety is by far the more common. The usual intermediate host is the sheep or other grazing animal, and the dog is the definitive host. In the sylvatic form, the moose, caribou, elk, reindeer, bison, or deer is the intermediate host; and the dog, wolf, fox, or coyote is the definitive host. The pastoral variety is common in the sheep-raising Mediterranean areas and in Australia, New Zealand, South America, and Africa. The sylvatic form is seen predominantly in Alaska and northern Canada and may be caused by a different subspecies of *E granulosus*. Nearly all cases of hydatid disease in the mainland United States and southern Canada have occurred in immigrants. Cases in northern Canada and Alaska have occurred primarily in Indians, Aleuts, and Eskimos.¹

Many smaller cysts are asymptomatic but, if symptomatic, usually cause cough, dyspnea, or chest pain. Hemoptysis and fever may occur, and if rupture into the bronchus occurs, expectoration of a salty substance often described as "grape skins" as well as symptoms of anaphylaxis may occur. Large pulmonary cysts may be discovered on physical examination as distention of the thoracic wall or a fluid wave (hydatid thrill) upon percussion of a large cyst. Serum studies are unreliable, and eosinophilia is uncommon (25 percent).²

On the chest x-ray film, an unruptured hydatid cyst has a sharply demarcated border, is polycyclic, round, oval, or notched, and has homogeneous appearance. It may be surrounded by atelectatic lung. Rupture into a bronchus may cause a crescentic layer of air or the characteristic "water lily" sign, representing a collapsed cyst floating in fluid of the ruptured hydatid. Calcification is rare and occurs late.³ Computed tomography has been helpful in endemic areas, as it may help localize smaller cysts not seen on the chest x-ray film and also detect asymptomatic concomitant

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1. Thiele et al. 2017
2. Thiele et al. 2017
3. Thiele et al. 2017
hepatic cysts. Haaga and Reich noted that the centers of echinococcal hepatic cysts showed higher attenuation coefficients (32 to 40 Hn units) than other simple cysts, but other investigators have noted near-water CT density in pulmonary cysts.

Treatment at present is surgical, although mebendazole and, now, albendazole have been variably effective. Percutaneous aspiration of cysts in suspected echinococcal infection should not be performed because of the danger of an anaphylactic reaction upon spillage of the material. Surgery may include (1) resection operations, (2) enucleation of the intact endocyst and obliteration of the pericyst cavity by a series of purse-string sutures, or (3) enucleation of the intact endocyst with the pericyst cavity left open (marsupialization). In endemic areas, pulmonary salvage is stressed, due to the high percentage of recurrence; resection operations are avoided unless a complicated cyst is present.

Subsequent to the diagnosis, our patient related a childhood spent in a rural Idaho community in which many of her friends lived on farms. She also spent about two years in her teens in Alaska (Fairbanks and Anchorage), before moving to New Orleans. We are unclear at which point she acquired this infection, but she apparently is cured at this time.

REFERENCES