Surgical Management for Hydatid Disease

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KEYWORDS

• Hydatid disease • Echinococcosis • Lung • Treatment • Surgery • VATS

KEY POINTS

- Hydatid disease is a parasitic infection caused by the *Echinococcus* family. It characterizes with cystic lesions located mainly in liver and the lungs.
- Diagnosis of a pulmonary cystic lesion in a patient who is living or has lived in an endemic area where hydatid disease is relatively common can be done by radiological findings and serologic tests.
- Although medical treatment with albendazole has promising results, surgical excision of the cyst by a parenchyma-saving operation remains the method of choice for most patients.
- Postoperative mortality can be related to an unrecognized cyst located in the brain or major vessels instead of the operation itself. For this reason, brain and mediastinal contrast-enhanced CT scans should be done in all patients with multiple hydatid cysts.

Hydatid disease is a parasitic infection caused by *Echinococcus*, a cestode of the Taeniidae family. It is characterized by cystic lesions occurring in different parts of the human body. The lung is second only to the liver as the main affected organ. Although not frequently, cysts can also be detected in the kidneys, brain, heart, soft tissues, and bones, along with intravascular lodgment. The disease is common in animal-raising regions and poses a significant public health problem in many areas worldwide.

THE PARASITE

Echinococcus is made up of a specialized attachment structure, the scolex, which contains a hook and several suckers, a neck, and two to six reproductive segments. The parasite is only a few millimeters long, rarely more than 7 mm. Among the four types of *Echinococcus*, *E granulosus* is the most common in humans. In addition, the rarely found *E multilocularis* (*alveolaris*) is responsible for the more disseminated form named alveolar hydatid disease. *E vogeli* and *E oligharthrus*, the causes of polycystic echinococcosis, are rare pathogens found only in Central and South America.[1]

In this article, only hydatid disease caused by *E granulosus* is discussed.

EPIDEMIOLOGY

The World Health Organization reports that *Egranulosus* has a worldwide geographic distribution and it may occur in countries all over the world.[2] A high parasite prevalence is found in areas of Europe and Asia, including the Balkan and Mediterranean

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regions, the Russian Federation and adjacent independent states, and in China. Also, the disease is observed in Australia and South America; whereas prevalence in up to 3% of the population has been reported in northern and eastern Africa where *E granulosus* is highly endemic.[2] Occurrence is sporadic in other regions including northern and central Europe and North America.

PATHOGENESIS

Echinococcosis is a cyclozoonosis, which means that it requires two vertebrate hosts to support its life cycle. The primary host is generally a dog, wolf, or other carnivore (except for cat). The parasite lives in the intestines of the primary host. After a disruption in the intestines, parasitic eggs are released into the environment via feces. The egg-carrying embryos can survive 1 week in water or up to 1 year in soil. The intermediate hosts, which are sheep, cattle, horses, goats, deer, pigs, elks, and so forth, ingest infected grass or vegetables or drink infected water and become infested. Embryos are released from the eggs and, by their hooklets, attach to and penetrate the duodenal or jejunal wall of the intermediate host. They are then brought to the liver via portal circulation. Most of the parasitic embryos are embedded in liver sinusoids but some can bypass them and, through the hepatic vein and inferior vena cava, enter the right heart and, finally, the lungs. Others enter the systemic circulation and disseminate to other organs such as spleen, brain, kidneys, and so forth.

Another pathway to the lung is also thought to exist. Embryos can proceed through the intestinal lymphatics into the thoracic duct and then to the right heart, finally reaching the lung. If a primary host eats infected viscera of the intermediate host, the cycle continues.

DISEASE IN HUMANS

Humans can be infested accidentally and become intermediate hosts as well. Because most of the embryos were captured in its sinusoids, the liver is the organ most commonly infected—between two to eight times more often than the lung.[3,4] An asymptomatic cyst is more commonly found in the liver than in the lung. In most reported series, the lower lobes of both lungs are affected more often than the upper lobes.[5–7]

In general, the cysts are solitary (**Fig. 1**), but some may be bilateral (**Fig. 2**), concomitantly locating in the lung and liver (**Fig. 3**), or multiple (**Fig. 4**). When the embryo has settled into an organ, the second larval stage begins. The natural course is the progressive growth of the cyst over a long period of time, but sometimes it may remain static.[8,9]

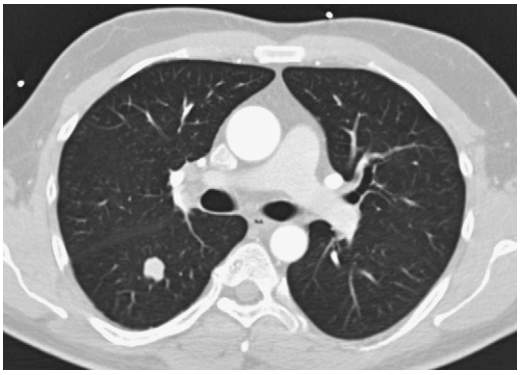

Fig. 1. A solitary hydatid cyst in the right lung.

The growth rate of the hydatid cyst varies in different organs. Tissue elasticity probably plays a major role in limiting the growth rate. Growth in soft organs is faster than in dense organs. There is evidence that liver cysts grow at a lower rate than lung cysts.[10,11] Negative intrathoracic pressure may result in rapid growth of a lung cyst, whereas the compact tissue and hepatobiliary capsules in the liver probably limit its growth.[12] In a child's lung, the hydatid cyst can probably develop more rapidly than in an adult's lung and grow to unusual size.[11]

THE CYST

A hydatid cyst (**Fig. 5**A, B) consists of a three-layered wall and fluid inside. The cyst fluid is clear, colorless, odorless, and sterile. Electrolyte level and pH are similar to that of the host's serum. The germinal membrane, also called the endocyst, is the innermost layer. It is the living part of the parasite and produces scolices and daughter

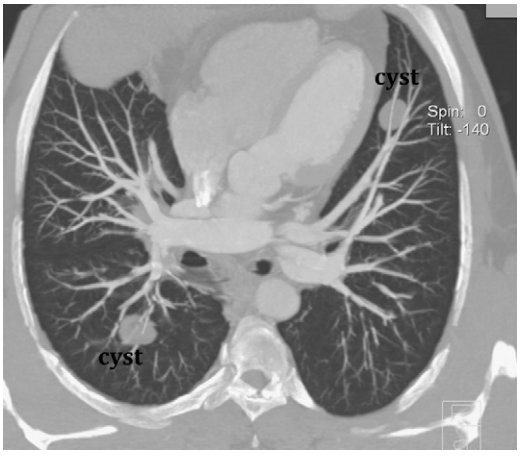

Fig. 2. Bilateral hydatid cysts in the lungs.