

## THE ROENTGENODIAGNOSIS OF PULMONARY HYDATID DISEASE: A review of 200 radiograms of hydatid cysts

### Akciğer hidatik hastalığının radyolojik tanısı: 200 radyogramın gözden geçirilmesi

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**Summary:** The diagnosis is made by the characteristic radiographic appearance of a round radiopaque lesion of a homogeneous density, because pulmonary hydatid cysts have nonspecific clinic and laboratory findings. A simple cystic appearance was found to be present radiologically in 70% of 200 cases managed surgically in the Department of Thoracic and Cardiovascular Surgery of Erciyes University Medical Faculty between 1978 - 1991. The rate of false-positive diagnosis was 3%.

**Key Words :** Radiodiagnosis, Pulmonary hydatidosis

**Özet:** Pulmoner hidatik kistlerin spesifik olmayan klinik ve laboratuvar bulguları olduğundan, tanı homojen dansiteli yuvarlak radyopakt bir lezyonun karakteristik radyografik görünümüyle konulur. 1978-1991 yılları arasında Erciyes Üniversitesi Tıp Fakültesi Göğüs ve Kalp-Damar Cerrahisi anabilim dalında cerrahî olarak tedavi edilen 200 olgunun yüzde yetmişinde radyografik olarak basit kistik görünüm vardı. Yalancı-pozitif tanı oranı yüzde üçtü.

**Anahtar Kelimeler:** Radyolojik tanı, Akciğer hidatidozu

**H** ydatidosis (echinococcosis) or hydatid disease has been known since ancient era and is endemic in numerous countries. The causative agent is the larva of the 4 mm long canine tape worm, *Taenia echinococcus*. The disease is localized to the liver and the lung. Pulmonary hydatid cysts are solitary in 70 percent and multiple in 30 percent and multiple in 30 percent. Solitary hydatid cysts prefer right lung and lower lobes (1, 2, 8). Cysts grow more rapidly in children than in adults. Pulmonary hydatid cysts do not grow much faster than 5 cm per year. Hydatid cyst is seen clearly in conventional lung roentgenograms, because of the contrast between cystic fluid and air in lung.

## METHODS

In the last 13 years, in our department, two hundred patients who managed surgically for pulmonary hydatidosis and ranged in age from 2.5 to 65 years were reviewed. For this reason, the clinic charts and X-ray films of the patients were re-examined. Hydatid cysts were typically observed against the background of the lung tissue. The radiologic findings were grouped as complicated and noncomplicated hydatid cyst.

## RESULTS

The patients between 2.5 and 9 years of age occurred in 12.2 percent of the cases, whereas the patients between 10 and 39 years of age occurred in 68.5 per cent of the cases. The most common clinical manifestations were cough (45.7 %) and chest pain (33.5 %). Ruptured cyst was the most frequent complication in preoperative period (20.8 %). There

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was infected cyst in 8.4 percent of the cases. In two cases (1 %), the cyst was ruptured during the operation. In the early postoperative period, the most common complication was atelectasis (6 %). The rate of recurrent cyst was 4 percent. In 5.8 percent of the cases, hydatid cyst was in the right lung, and in 47 percent was in the lower lobes. The most common radiologic finding was a simple cysts (70 %) (Table 1).

Table 1. Radiologic findings.

	n	%
Non-complicated cyst		
Simple cyst	133	66.5
Sunset sign	6	3.5
Hydatidocystic respiration sign*	1	0.5
Complicated (ruptured) cyst		
Lotus-on-water sign	21	10.5
Hydro-aeric cyst	13	6.5
Hydrothorax	18	9.0
Air crescent sign	5	2.5
Cumbo's sign	1	0.5
Incarceration of germinative layer	1	0.5
Aeric cyst	1	0.5

\* = This sign, longitudinal elasticity during deep breathing on fluoroscopy, was examined in two patients.

## DISCUSSION

If pulmonary hydatid cyst do not rupture, they are characterized by a regular margin, a definite limit, a uniform homogen density, a round or ovoid shape, single or multiple cysts, and a real isolated image on the chest film (4, 5, 7). Cysts are usually solitary, but in 20-30 percent of cases they may be multiple in one or several organs (3-5, 8).

A giant pulmonary hydatid cyst gives to compression on the tracheoles, which lead to segmental atelectasis and become fibrosis (4, 5, 7).

Cysts may reach its size from 1 cm to tens cm. Little cyst are round, large cysts are round or oval

shape, sometimes they may be a lobulated, multicystic form. Benign mesotheliomas may be misdiagnosed as hydatid cyst at the interlobar space (2). Cyst are altered from a spherical to an ovoid shape during deep inhalation, i.e., vertical diameter increased during inspiration and horizontal diameter rised during expiration "Escudoro-Nenerow" sign or "hydatidocystic respiration sign" (1,4,5,7). Hydatid cyst may lead to Pancoast's syndrome when located at the thoracic outlet (2).

There are some differences between hepatic and pulmonary hydatids. These are (1) in the intact hepatic hydatid cyst, daughter cysts that are small hydatid cysts which originate and reside within the original mother cyst are found very commonly, whereas in the pulmonary cyst they are rare, (2) two closely situated hepatic cysts may actually communicate with each other, but this does not happen in the lung, each hydatid remaining anatomically separate from the other, (3) cystic calcification that is really a signal of the parasite's death is more common in hepatic than in pulmonary cysts (4,7). In our series the rate of calcification was 0.5 percent (1). In literature, this rate is 0.8-1 percent (3,5,8).

Hydatid cysts situated in the lower right lung often overlapped with the diaphragm, making it difficult to differentiate cysts deriving from the lower part of the right lung from those developing in the upper liver "sunset sign". In such cases, diagnostic pneumoperitoneum is helpful (5). It had been performed to four of seven cases in our previous series (1), but it had not been performed in remaining three-giant cysts because of their adhesion to the diaphragm after complications of bacterial infections and long-term compression.

Ruptured hydatid cysts imitate many specific such as tuberculosis and nonspecific such as abscess infections of the lung and pulmonary neoplasm such as epidermoid carcinoma, adenocarcinoma, metastatic cancers, and mesothelioma (4, 7).

In vivo separation of the intact pulmonary cyst from its pericyst bed, forms around the cyst and consist of host fibrous tissue and compressed lung parenchyma, is brought about by an air stream

entering through bronchial holes into the potential space between the parasite and the host the resulting radiological sign, is basically a retraction of the intact laminated membrane from the pericyst wall, is called a "pneumocyst". Its synonyms are "pericyclic pneumonia", "perivesiculum pneumonia", "perivesicular meniscus", "moon sign", "air crescent sign", "signe ring sign", "lunar belt", "sickle-sign" etc. (Figure 1) (1,5,7). This lunar belt of air could move upward with a change of posture and broaden with continuous leakage of gas into it or disappear through absorption (5).



Fig.1. Pericyclic pneumonia

In a stage later than in pneumocyst, laminated membrane is no longer intact and air has entered the cyst itself keeping it at least partially expanded. The radiological picture of this situation that is unstable is called "double-domed arch". Other names "Ivanissevich's double-arch", "double arch sign", "perivesicular and intravesicular pneumocyst", "Cumbo's sign", "double-sickle sign" etc. In situation of double-domed arch, the upper 'arch' is the pericyst wall, and the lower 'arch' is the laminated membrane or exocyst (Figure 2) (3,5,7). According to some authors, a pneumocyst is interpolation of gas the space between the endocyst and ectocyst, and a double-domed arch is the interpolation of gas both in the endocyst and in the ectocyst (3-5).



Fig.2. Perivascular and intravesicular pneumonia

After unstable 'double-domed arch', all the air has escaped from within the torn and broken up exocyst (i.e., laminated membrane), which now floats within some residual fluid inside the pericyst cavity. The resulting radiological diagnostic picture is known as "lotus-on-water sign". Other names are "water-lily sign", "sign of the camelote" etc. (Figure 3) (7). According to some authors 'water-lily sign' occurs as



Fig.3. Water lily sign

following: if the hydatid cyst ruptures into the segmental bronchus or if the cystic split is large, the endocyst cannot stay intact but instead ruptures due to swelling at the ectocyst split, and with gas entering the cyst, the endocyst collapses and floats on the cystic fluid (3,4,6).

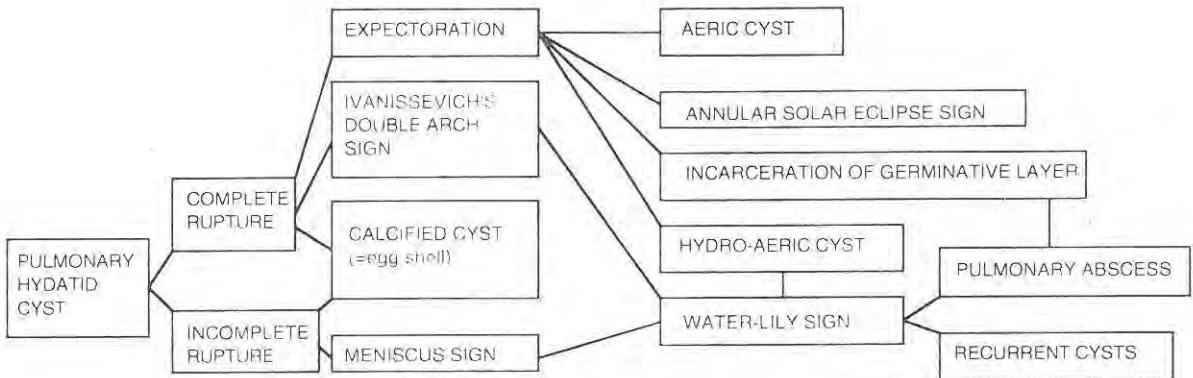
If the cyst underlying visceral pleura ruptures into the pleural cavity, the collapsed cyst floats in the cystic fluid "the water lily sign" (5). Such five of our cases with ruptured cyst into the pleural cavity had been reported previously (6).

cystic fluid can be coughed out entirely and the thick endocysts roll up into lump-like masses that cannot be coughed out, instead migrating into the empty loculi of ectocyst "mass migrating sign".

Diaphragmatic hernia such as Bochdalek hernia may rarely be diagnosed as pulmonary hydatid cyst at the pulmonary basis (2).

Sometimes, the cyst is associated with pulmonary effusion (9 percent) (3). A radiological algorithm for the complicated hydatid cyst is given in table 2.

Table 2. Radiological algorithm for the complicated hydatid cyst



Sometimes, the cystic fluid is coughed out entirely during the rupture of the cyst, and the collapsed endocyst is remained in the residual loculi of the ectocyst "incarceration of germinative layer". Now and then, endocyst and cystic fluid is coughed out together "aeric cyst". The rate of aeric cyst was 30 % (4,5,7).

If a cyst that is ruptured into the bronchus empties all of the cystic fluid by coughing, and after endocyst is filled with air, the roentgenographic picture is named as the "annular solar eclipse sign" (5).

If major cysts rupture into the minor bronchi, the

The pulmonary hydatid cysts may be solitary (unilateral or bilateral) or multiple (unilateral or bilateral). In a series (8), solitary unilateral cysts were found in 67.7 percent of the cases, and multiple unilateral, 22.6 percent and multiple bilateral, 5.1 percent. In the some series, simple cysts were found in 57.4 percent, and complicated cysts were in 42.6 percent. In another series (2), solitary cysts were found in 72 percent, and unilateral multiple, in 15 percent, and bilateral multiple, in 13 percent. In series of Ayuso et al (3), single cysts were in the right ( 70 %) and solitary ( 80 %). In our cases, the rate of solitary cysts were 78 percent. Bilateral solitary cysts were found in 7 percent (Fig. 4), and unilateral multiple cysts were found in 9 percent (Fig. 5).

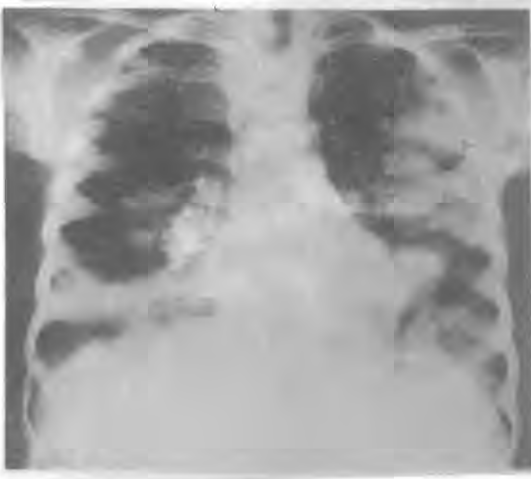


Fig.4. Routine frontal chest roentgenogram showing bilateral hydatid cysts in the right and left upper lung fields

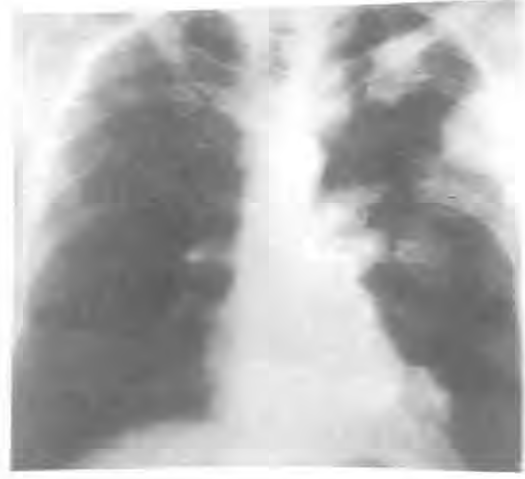


Fig.5. Frontal chest roentgenogram showing multiple intact echinococcal cysts in the left lung

The main diagnostic tool is the roentgenogram (1-8). In the literature (3), the roentgenography has allowed an exact diagnosis in 98 percent. However, now and then the cystic image appears indistinguishable from that of cyst of different origins such as pericardial or

bronchial cyst and an abscess both specific and nonspecific or a malignant tumor. In our series (1), bronchial cyst were found in these patients, pericardial cyst was in two, Schwannoma was in one (False-positiveness was 3 percent).

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