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## RESEARCH ARTICLE

### PULMONARY HYDATID CYSTS IMAGING

\*Hayfaa Hashim Mohammed

Specialist in Radiology and Imaging, Iraq

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\*Corresponding author:  
Hayfaa Hashim Mohammed

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#### ABSTRACT

**Background and objective:** Hydatid disease is a zoonosis that can involve almost any organ in the human body. After the liver, the lungs are the most common site for hydatid disease in adults. Imaging plays a pivotal role in the diagnosis of the disease, as clinical features are often nonspecific. The aim of this study is to present the common imaging finding of this disease in our locality. **Methods:** In this study, we reviewed the imaging findings of twenty five patients with pulmonary hydatid cysts in Mosul teaching hospital over 3 years (Jan.1999-Dec.2002). The main objective was to study the imaging finding of this disease. **Results:** Twenty five patients were reported to have pulmonary hydatid cysts by different imaging modalities. Seventeen patients were male and the main age was 39 years (6-72), fourteen patients were diagnosed by chest x ray. **Conclusions:** Hydatid disease is a manifestation of larval infestation by the echinococcus tapeworm. In adults, the lungs are second-most common organ to be involved by hematogenous dissemination. Uncomplicated pulmonary hydatid cysts are most commonly diagnosed incidentally on imaging.

#### INTRODUCTION

Hydatid disease is primarily an illness of residents in rural areas who frequently come into contact with carnivores. Human hydatid disease, caused by the larval form of *Echinococcus granulosus*, has a worldwide distribution, and is endemic in many countries in the Mediterranean region, the Middle and Far East, and South America (Lewall, 1998 and Haliloglu, 1997). The liver is the most common organ to be involved in adults (75%), followed by the lungs (15%) (Lewall, 1998 and Haliloglu, 1997). While in the pediatric population, the lungs are the most common site of involvement (Haliloglu, 1997 and Balci, 2002). Uncomplicated hydatid cysts of the lungs are usually asymptomatic, while complicated cysts present with nonspecific clinical features like coughing, chest pain, and hemoptysis. Imaging thus plays a pivotal role in the diagnosis of the disease. Although typical imaging findings have been well described in the literature, radiologists should also be aware of atypical imaging findings that can occur secondary to complications. The lungs are the most common site in the pediatric population and the second-most common site in adults. Lung hydatid cysts have certain peculiar characteristics compared to cysts in other locations. The lungs facilitate the cyst's growth due to negative pressure and their compressible nature (Lewall, 1998; Balci, 2002 and Ramos, 2001). As a result, hydatid cysts grow in the lungs three times faster than in the liver (Balci, 2002).

In addition, calcification occurring in only 0.7% of cases (Ramos, 2001), and daughter cyst formation in lung hydatids are very rare (Ramos, 2001 and Pedrosa, 2000).

#### PATIENTS AND METHODS

In this study, we reviewed the imaging findings of twenty five patients with pulmonary hydatid cysts in Mosul teaching hospital over 3 years (Jan.1999-Dec.2002). For all patient included in the study a detailed history and physical examination was done. Most of the patients presented with sign and symptoms of bronchitis (long standing irritative cough with some chest pain and shortness of breath) some cases was discovered to have pulmonary hydatid cyst accidentally during doing chest radiography while investigated. Most of the patients were diagnosed by chest x ray and other to be proved by pulmonary CT scan.

#### RESULTS

Twenty five patients were reported to have pulmonary hydatid cysts by different imaging modalities. Seventeen patients were male and the main age was 39 years (6-72), fourteen patients were diagnosed by chest x ray, ten patients need further study by pulmonary CT scan, and one patient was diagnosed by ultrasound of chest wall swelling and proved by chest x ray. Table 1 shown distribution of patients study regarding age of sex.

**Table 1. Distribution of patients with Pulmonary Hydatid Cyst in regarding to age and sex**

Age	Male	Female	Total
6-18 years	6	4	10
Above 18years	11	4	15
Total	17	8	25

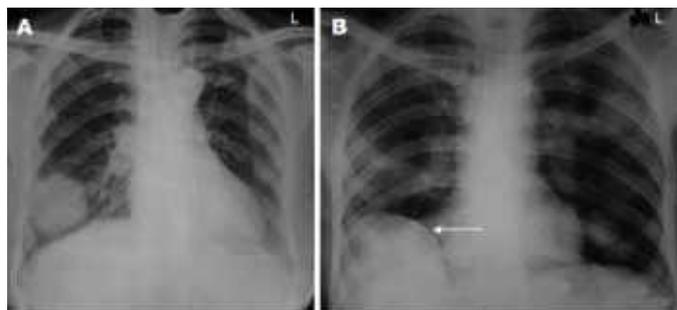
## DISCUSSION

Most pulmonary hydatid cysts are acquired in childhood and remain asymptomatic for a long period of time. Uncomplicated hydatid cysts are usually diagnosed incidentally on chest X-rays (Ramos, 2001), Figures (Lewall, 1998; Aletras, 2000; Haliloglu, 1997; Balci, 2002 and Ramos, 2001). Chest pain, dyspnea, dry coughing, and hemoptysis can occur due to the mass effect caused by larger cysts. Acute-onset chest pain, coughing, hemoptysis and anaphylactic reactions may suggest cyst rupture (Ramos, 2001; Pedrosa, 2000 and von Sinner, 1991). Hydatid cyst rupture is the most common complication occurring in up to 49% of cases. Ruptures may be contained (by detachment of the pericyst from the endocyst), communicating (with the bronchus) and direct (rupture of all membranes with spillage of contents) (von Sinner, 1991 and Kuzucu, 2004), Figures (Pedrosa, 2000 and von Sinner, 1991). The risk of rupture increases with the size and number of cysts (Balci, 2002). Cyst rupture can occur into bronchus (manifesting as coughing with sputum containing hydatid sand and membrane fragments) (Kuzucu, 2007), or the pleural cavity (manifesting as pneumothorax, effusion, and emphysema) (Turgut, 2007). Occasionally pleural seeding from live scolex during a rupture can cause secondary pleural disease (Turgut, 2007). Infection is the most common complication of cyst clinically presenting with features of lung abscess (Lewall, 1998). The lungs are the second-most common site for hydatid cysts in adults. The lower lobes are the most common location in the lungs (in 60% of cases) with the right basal lobe being more common (Lewall, 1998; Ramos, 2001 and Doğan, 1989). In 30% of cases, there is more than one cyst, and they can be bilateral in 20% of cases (Lewall, 1988 and Ramos, 2001). X-ray and computed tomography (CT) are the usual imaging modalities used. Ultrasound can be beneficial in peripheral lesions and to assess pleura. Classical signs of Pulmonary Hydatid Cyst on Chest X ray shown in Table 2.

**Table 2. Classical signs of Pulmonary Hydatid Cyst on chest Xray**

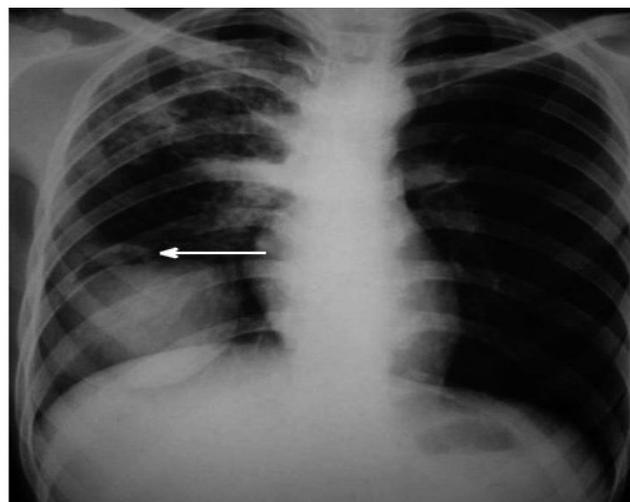
Un complicated Hydatid cyst
Radio-opacity (resembling canon ball on AP and rugby ball on lateral projection)
Polycyclic and bilobed appearance
Slot sign (impending rupture)
AP: Anteroposterior

An uncomplicated hydatid cyst appears as a well-defined homogenous radio-opacity on a chest X-ray (Haliloglu, 1997 and Polat, 2003) (Figure 1A). Differential diagnoses on a chest X-ray include fluid-filled cysts, benign tumors, carcinoma, metastases, and inflammatory masses (Saksouk, 1986 and Aggarwal, 1989). The appearance of cysts has been compared to cannon balls in anteroposterior projection and to rugby balls in lateral projection (Polat, 2003).

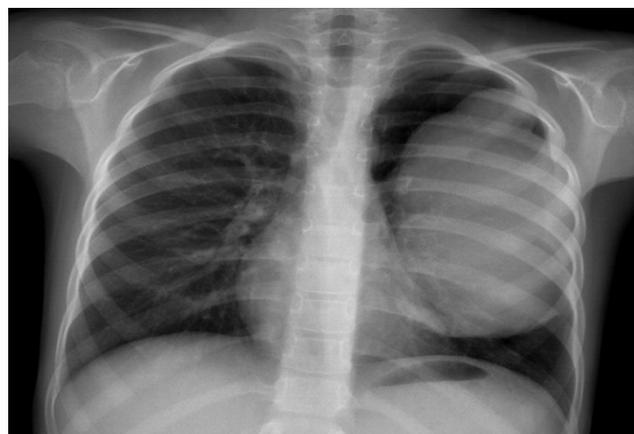


**Figure 1. Uncomplicated hydatid cyst. A: Posteroanterior view of chest X-ray showing well defined round radio-opacity in right lower zone; B: Chest X-ray showing multiple well defined round opacities in left lung. Also note presence of calcified cyst in liver (arrow)**

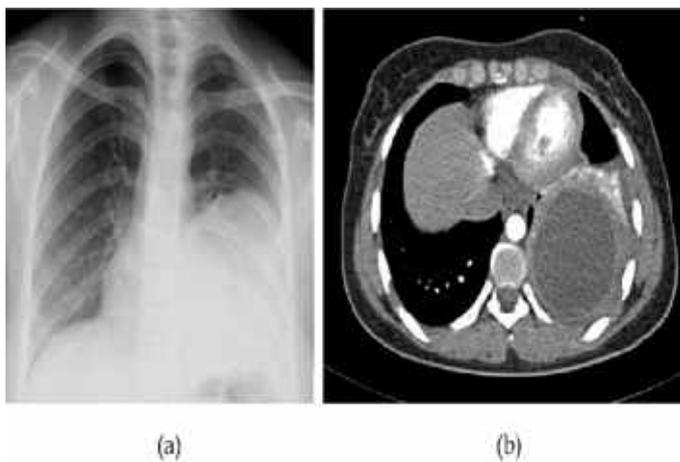
Simple hydatid cysts are sharply demarcated from adjacent lung parenchyma. However, atelectatic and reactive changes in the adjacent lung can cause the loss of p margins of cysts on an X-ray, thereby mimicking pneumonia or carcinoma (Reeder, 1970). Multiple large masses in the lungs are pathognomonic for hydatid cysts (Reeder, 1970 and Koul, 2000) (Figure 1B). Calcification is very rare.



**Figure 2. Air crescent sign: Chest X-ray showing well defined round radio-opacity in right lower zone with presence of a radiolucent rim at its superior aspect (arrow). This sign is however not specific for hydatid cyst and can be seen in mycetoma, bronchogenic carcinoma**



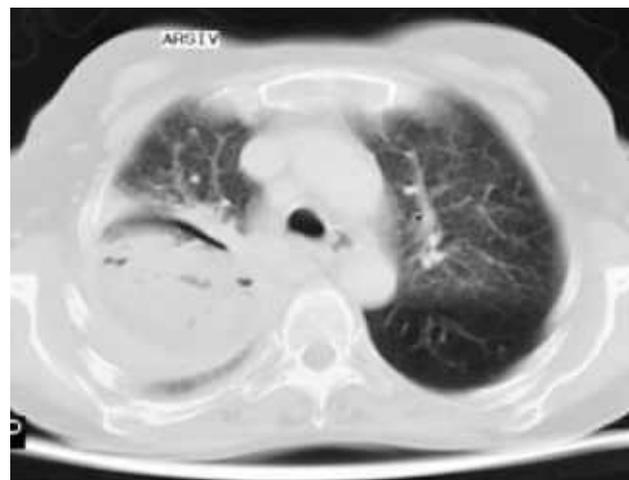
**Figure 3. A 15-year-old boy. Chest radiograph shows a huge hydatid cyst located in the upper and mid-zone of the left lung causes displacement of the mediastinum to the right**



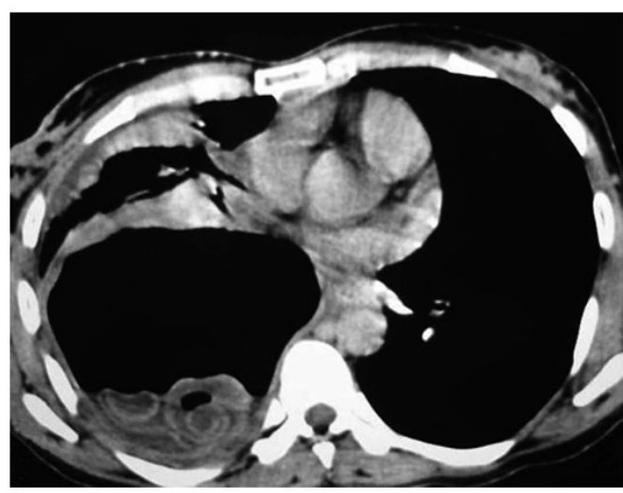
**Figure 4(a).** Chest radiograph shows well-defined mass in the lower zone of the left lung obscuring the left ventricular margin and costophrenic sinus. (b) Axial CT obtained through the postero-basal segment of the left lung shows a high-density cystic lesion and also parenchymal consolidation adjacent to the HC



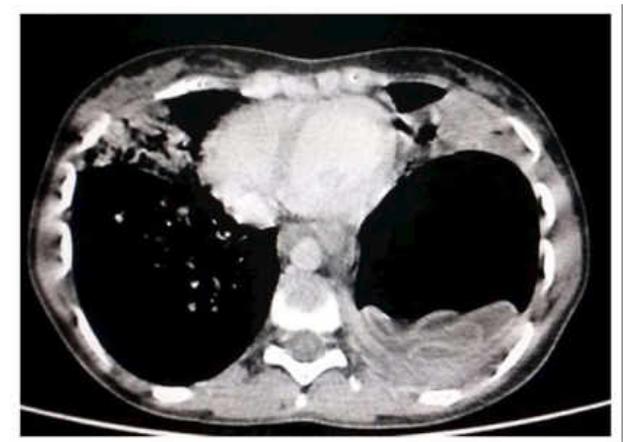
**Figure 5. (a)** Chest radiograph shows multiple Hydatid cysts located in both lungs as well-defined lesions. (b) CT scan shows multiple hydatid cysts in both lungs as well demarcated cystic masses



**Figure 6.** CT appearance of meniscus sign: A crescent shaped air is seen in the potential space between the pericyst and ectocyst of the cystic lesion



**Figure 7.** CT scan image in a case of ruptured hydatid cyst showing air and fluid with multiple curvilinear hyperattenuating membranes in dependant part (Whirl sign).



**Figure 8.** Water lily sign on computed tomography. Axial computed tomography image in a case of ruptured hydatid cyst showing air fluid level with crumpled endocyst appearing as floating membrane at air fluid interface

CT features of uncomplicated hydatid cysts, Computed tomography signs described in pulmonary cyst, summarized in Table 3, and Figure (4-8).

**Table 3. Computerized Tomography signs of Pulmonary Hydatid Cyst**

Signs of contained rupture	Signs of cyst rupture
Crescent sign	Gumbo sign
Signet ring sign	Serpent sign
Air bubble sign	Swirl sign
	Water lily sign

Uncomplicated hydatid cysts appear as well-circumscribed fluid attenuation lesions with homogenous content and smooth, hyper dense walls. Unlike hydatid cysts of the liver, calcification and daughter cyst formation are rare in lung hydatids (Ramos, 2001). Intact hydatid cysts can be difficult to differentiate from other pulmonary cysts (Saksouk, 1986). CT features due to infection: Increases in the size and number of pulmonary hydatid cysts increase the risk of infection (Kuzucu, 2004), and the density of content are seen in cases of superadded infection of hydatid cysts (Pedrosa, 2000 and Erdem, 2003).

**Conclusion**

Hydatid disease is a manifestation of larval infestation by the echinococcus tapeworm, common in various endemic regions.

In adults, the lungs are second-most common organ to be involved by hematogenous dissemination. Uncomplicated pulmonary hydatid cysts are most commonly diagnosed incidentally on imaging. Though a variety of signs have been described on imaging, complicated hydatid cysts can present with atypical imaging findings. CT is the imaging modality of choice, especially in complicated hydatid cysts, and can provide an accurate diagnosis by demonstrating the internal characteristics and morphology of the lesion. Thus, radiologists should be well aware of the typical and atypical imaging features of the disease.

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