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Original Research Paper

Radio-Diagnosis

STUDY OF RADIOLOGICAL FINDINGS IN PULMONARY HYDATID DISEASE AND ITS DIAGNOSIS

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ABSTRACT

BACKGROUND: Hydatid cyst commonly affects liver followed by lung, but may be found in almost any organ simultaneously. We present an unusual case of disseminated pulmonary hydatidosis and its imaging features before medical therapy.

AIMS AND OBJECTIVE: To find out the radiological features related to diagnosis of pulmonary hydatid disease.

MATERIAL AND METHODS: This was a descriptive, prospective study conducted for a period of 1 year from February 2020 to January 2021. Institutional Ethical Committee (IEC) approval was obtained for the study, and informed consent was taken from each patient. Patients suspected of having pulmonary Echinococcosis on their clinical profile and preliminary chest radiography was included in the study. All the patients were examined with a chest CT. A total of 106 patients comprising 65 males and 41 females with age range of 18 to 62 years were included in the study.

RESULT: A total of 106 patients comprising 65 males and 41 females with age range of 18 to 62 years (mean ± SD; 33.3 ± 24.6 years) were included in the study. Final cohort consisted of 95 patients because 11 patients were lost to follow-up/attrition. Among the final cohort of 95 patients, 84 were found to have hydatid disease as the final diagnosis.

CONCLUSION: Most pulmonary hydatid cysts can be diagnosed confidently on CT; some complicated cysts assume atypical appearances and closely mimic necrotic lung carcinoma, abscess, or schwannoma, making diagnosis difficult. The lungs are the second most frequent location of hematogenous spread of HC in adults and probably the most common location in children.

KEYWORDS : Pulmonary; Hydatid; Cyst; Radiography; Computed tomography.

INTRODUCTION:

Hydatid disease (Echinococcosis) is a parasitic infection primarily caused by the larvae of the cestode Echinococcus granulosus (E. granulosus). This tapeworm is responsible for cystic Echinococcosis (CE), which is the most common form [1]. Echinococcosis, a zoonotic disease caused by the larval form of the cestode Echinococcus, still constitutes a major health concern in sheep rearing areas of Asia, the Mediterranean, Australia, and New Zealand. Echinococcus can affect any human organ. The liver is the most commonly affected organ (75%) followed by the lungs (15%) [2,3]. Less commonly, spleen, kidney, bones, brain, muscle, etc. are involved [2]. Pulmonary hydatid disease can be asymptomatic or may present with cough, chest pain, breathlessness, or hemoptysis [3,4]. Disseminated hydatidosis is a rare disease and may involve any organ of the human body [5].

Pulmonary involvement

The pulmonary parenchyma is the second most frequent site of involvement in adults (10–30%) and the most common site of involvement in children and young adults [6, 7]. The lungs facilitate cyst growth because of their compressibility and negative pressure. Therefore, the size of pulmonary parenchymal HC may vary from 1 to 20 cm [8, 9]. Giant HC is usually defined as a cyst with the largest diameter of more than 10 cm and is more commonly reported in children than in adults due to the immature immune system and greater elasticity of the lung tissue. Pulmonary HCs are mainly located in the lower lobes (55–70% of cases) and maybe multiple (30%) and bilateral (20%) [10- 16] Pulmonary HCs usually remain asymptomatic until they rupture. Clinical symptoms such as sudden coughing attacks, hemoptysis, dyspnea, fever, and chest pain can be seen. Although allergic reactions may develop due to cyst rupture, fatal anaphylaxis is uncommon [13, 17]. Radiological manifestations of pulmonary HCs can be variable depending on the presence of complications. They can be classified as uncomplicated and complicated (contained rupture, complete rupture, super infection). Besides pulmonary HCs, associated thoracic findings can be seen.

AIMS AND OBJECTIVE:

To find out the radiological features related to diagnosis of pulmonary hydatid disease.

MATERIALS AND METHODS:

This descriptive, prospective study conducted for a period of 1 year from February 2020 to January 2021. Institutional Ethical Committee (IEC) approval was obtained for the study, and informed consent was taken from each patient.

INCLUSION CRITERIA

Patients suspected of having pulmonary Echinococcosis on their clinical profile and preliminary chest radiography was included in the study. All the patients were examined with a chest CT. Patients with an unequivocal diagnosis of pulmonary hydatid cyst on CT preceded for treatment. However, in cases with a diagnostic dilemma CT was performed to overcome the diagnostic difficulty. The indications for MRI included the following: thick irregular cyst wall, imperceptible cyst wall, enhancing cyst wall, presence of internal septations within the cyst, solid appearance, presence of mediastinal or hilar lymphadenopathy, and presence of filling defect in pulmonary arteries.

EXCLUSION CRITERIA

Patients with hypersensitivity reaction to iodinated contrast and severely deranged renal function were excluded from the study.

STATISTICAL ANALYSIS:

Statistical analysis was performed using the Statistical Package for the Social Sciences (SPSS Inc. Chicago, IL, version 21.0)

RESULT:

A total of 106 patients comprising 65 males and 41 females with age range of 18 to 62 years (mean ± SD; 33.3 ± 24.6 years) were included in the study. Final cohort consisted of 95

patients because 11 patients were lost to follow-up/attrition. Among the final cohort of 95 patients, 84 were found to have hydatid disease as the final diagnosis, which was confirmed by surgery and/or biopsy. Eleven patients were found to have alternate diagnosis, which included lung abscess (n = 4), intrapulmonary bronchogenic cyst (n = 1), malignant lung neoplasm (n = 3), schwannoma (n = 1), spindle cell neoplasm (n = 1), and metastasis (n = 1).

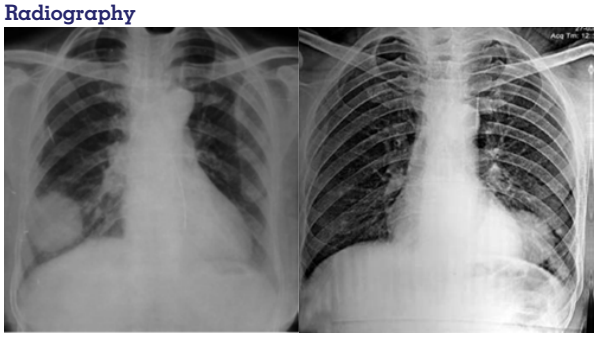
The commonest CT finding of surgery/histopathology proven hydatid cysts (n = 84) was unilocular hypodense cyst with a well-defined perceptible wall with surrounding consolidation (29) (34.6%) or normal surrounding lung parenchyma (*n* = 18) (21.4%).

(Figure 2) Axial (A) and coronal (B) computed tomography images in a 22-year-old boy showing large well circumscribed cyst in left lower lobe with thick smooth wall and small pleural effusion

IMAGING FEATURES

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. [1, 13, 17, 19]. In 30% of cases, there is more than one cyst, and they can be bilateral in 20% of cases [1,13]. X-ray and computed tomography (CT) are the usual imaging modalities used. Ultrasound can be beneficial in peripheral lesions and to assess pleura.

Radiography



(Figure 1A) (Figure 1B)

Figure 1A: An uncomplicated hydatid cyst appears as a well-defined homogenous radio-opacity on a chest X-ray.

Figure 1B: Frontal radiograph of chest (B) shows a homogenous round opacity in left lower lobe.

Differential diagnoses on a chest X-ray include fluid filled cysts, benign tumors, carcinoma, metastases, and inflammatory masses [20, 33, 34]. The appearance of cysts has been compared to cannon balls in anteroposterior projection and to rugby balls in lateral projection [32]. Cysts can assume polycyclic configuration due to pressure from adjacent structures [18]. Notching can also occur in cysts, giving them a bilobed appearance [18]. The loss of a spherical shape on an X-ray with the appearance of small depression (resulting in a reniform shape) may

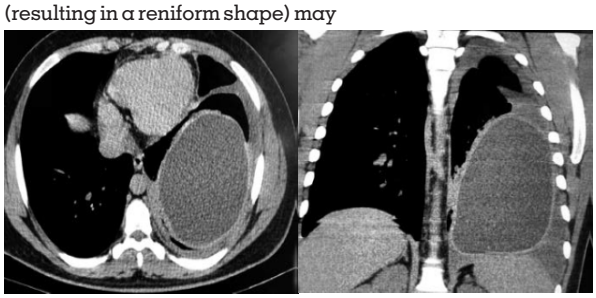


Figure 2. Axial (A) Figure 2. Axial (B)

Figure 2. Axial **(A)** and coronal **(B)** computed tomography images in a 22-year-old boy showing large well circumscribed cyst in left lower lobe with thick smooth wall and small pleural effusion.

Table :1- Classical signs of pulmonary hydatid cyst on chest X-ray

Uncomplicated hydatid cyst	Complicated hydatid cyst
Well circumscribed round radio-opacity(resembling canon ball on AP and rugby ball on lateral projection)	Crescent sign
Polycyclic and bilobed appearance	Cumbo or double arch sign Water lily or camelotte sign
Slot sign (impending rupture)	Rising sun sign Dry cyst sign

Table 2: Computed tomography signs described in pulmonary hydatid cyst

Signs of contained rupture
Crescent sign
Inverse crescent sign
Signet ring sign
Air bubble sign
Signs of cyst rupture
Cumbo sign
Serpent sign
Swirl sign
Water lily sign
Mass within a cavity sign
Incarcerated membranes sign
Dry cyst sign
Signs of cyst infection
Air bubble sign
Ring enhancement sign
Air fluid level

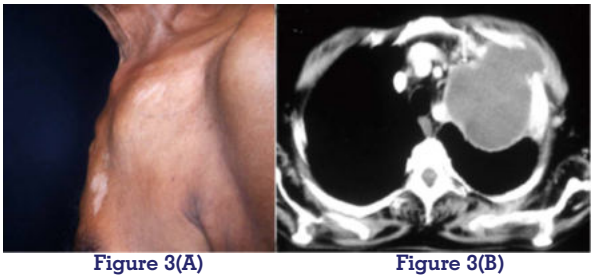


Figure 3(A) Figure 3(B)

Figure 3(A) and 3(B): 55-year-old male patient presented with swelling in left anterior chest wall. Contrast enhanced computed tomography of the chest revealed hydatid cyst in left lung extending into left anterior chest wall.

DISCUSSION:

One of the most important endemic areas of human hydatid disease in Asia is Iran [18]. Hydatidosis is a unique parasitic disease which can occur almost any- where in the body and demonstrates a spectrum of imaging features that vary according to growth stage, associated complications, and affected tissue. The lungs are the most commonly involved organ in children. Even though hydatidosis mainly affects the liver and the lungs, other organs such as the brain, skeletal muscle, spleen, kidney, and bone may also be involved. Among the comparatively less commonly involved areas, the rarest site is the parenchyma of the brain [19]. Hydatid cysts of the lung can occur in both lobes of the lungs, with the right lower lobe being the most commonly involved area. Although the infection may also occur in child- hood, due to the slow growth and progression of the disease, most adults with the liver and lungs hydatid cysts are symptomatic, and only about 10%-20% of cases are detected up to the age of 16 years.

Different imaging modalities such as CT scan, MRI, and ultrasound (ultrasound scanning or sonography) can detect lesions in deep organs such as the liver and lungs, and help determine the extent and position of cysts that are fluid-filled and lack blood supply. Due to nonspecific clinical signs, the definitive diagnosis is based on imaging, serologic, and histologic findings [20]. The result of the serologic test was negative for the patient. Radiologic feature of cerebral hydatid cysts consists of unilocular cyst which is isointense or isoattenuating relative to cerebrospinal fluid and in the fibrous capsule fine peripheral enhancement can be seen. Differential marker of cerebral CE from tumor and abscess is absence of surrounding edema and the marked mass effect. Also, characteristic feature of CE of the brain, especially on T2-weighted MRI, is the presence of a hypointense rim [21]. Hydatid cysts in the liver have 2 subtype included solitary (single) and multiple which can appear unilocular or multilocular. Calcification is occasionally occurs in the wall of the cysts and is seen at radiography in 20%-30% CE of the liver. Calcification is regularly curvilinear or ring like and involves the pericyst. The cyst wall of liver CE is ordinarily thin and well defined but may be thick and can enhance on CT scan. In the pericyst, "split wall' can create by split-up of the laminated membrane [22,23] . Hydatid cysts in the spleen are usually single, and their radiologic features are same to those of hepatic CE. Calcification may also be seen in the splenic cysts [24]. In our case, cerebral hydatid cyst had the typical radiologic features that mentioned. In the case of liver and spleen hydatid cyst in this case, stage 1 without calcification and multiple involvement was observed. As seen in the mediastinum view, lung hydatid cyst in this case is a hypo-attenuate soft tissue mass which has not accordance to mentioned sign and in some cases [25].

CONCLUSION:

Although most pulmonary hydatid cysts can be diagnosed confidently on CT, some complicated cysts assume atypical appearances and closely mimic necrotic lung carcinoma, abscess, or schwannoma, making diagnosis difficult.

The lungs are the second most frequent location of hematogenous spread of HC in adults and probably the most common location in children. In addition to pulmonary HC, HC may develop in any extra pulmonary region including the chest wall, pleural cavity, fissures and diaphragm, mediastinum, heart, and vascular structures. As symptoms are non-specific, imaging plays a crucial role in the diagnosis of hydatid cyst in common pulmonary and uncommon extra pulmonary locations. Imaging can also show complications and extension of hydatid cyst. A good knowledge of imaging findings and differential diagnosis of hydatid cyst will enable early diagnosis and guide the therapeutic management.

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