The Trans-Diaphragmatic Hydatid Cyst: An Unconventional Surgical Strategy

Hajar Hachim, MD; Mouna Alaoui, MD; Mohamed Mountasser, MD; Anass Mohammed Majbar, MD; Farid Sabbah, MD; Mohamed Raiss, MD; Abdelmalek Hrora, MD; Mohamed Ahallat, MD

Clinique Chirurgicale A, Ibn Sina University Hospital, 10090 Rabat, Morocco

ABSTRACT

Introduction: The hydatid disease is a zoonotic infection due to the tapeworm echinococcus granulosus (TEG). In 50-70% of the cases, the hydatid cyst is observed with a hepatic localization. The trans-diaphragmatic extension of a liver hydatid cyst is rarely reported in the literature. Here, we report the singularity of our observation which focuses on an abdominal approach rather than a thoracotomy and the way we handle the diaphragmatic defect.

Observation: A 34-year-old male patient presented with a right hypochondriac pain evolving since 2 years. The abdominal examination found a bulging just below the right costal margin. The ultrasound and computed tomography (CT) scan images show an enormous liver hydatid cyst covering the entire posterior right section and extending beyond the diaphragm to the right hemi-thorax. Our therapeutic strategy consisted of a resection of the protruding dome with aspiration and evacuation of all the hydatid material. We did not close the diaphragmatic defect because there was no communication with the thorax contents. Our management had no negative impact on the patient in 2 years of follow-up.

Conclusion: Being rarely reported in the literature, the trans-diaphragmatic hydatid cyst is an uncommon situation. The surgical intervention is the mainstay treatment. Our management of the diaphragmatic defect was unconventional. The singularity of our approach is to not close the diaphragmatic defect since we considered the remaining fibrous capsule as a closure, avoiding a laborious dissection and a complex diaphragmatic reconstruction.

KEY WORDS: Surgery; Trans-diaphragmatic; Hydatid cyst; Zoonotic infection; Tapeworm; Echinococcus granulosus.

ABBREVIATIONS: TEG: Tapeworm Echinococcus Granulosus; CT: Computed Tomography; MRI: Magnetic Resonance Imaging; E: Echinococcus; WBC: White Blood Cell; ELISA: Enzyme-linked immunosorbent assay.
upper quadrant pain evolving since 2 years without radiation associated to asthenia and weight loss. The patient had no history of fever, neither digestive nor respiratory symptoms. During the abdominal examination, we found a bulging just below the right costal margin with no tenderness during palpation. The respiratory system examination showed dullness instead of resonance at the percussion of the inferior part of the right hemi-thorax. Biologic investigations revealed hemoglobin 11 g/ml, white blood cell (WBC) 8400/mm³ and eosinophils were not elevated. An abdominal ultrasound confirmed the diagnosis of a voluminous hepatic hydatid cyst partially calcified which extended through the diaphragmatic dome. An additional thoraco-abdominal CT scan showed a large hydatid cyst covering almost the totality of the right posterior section of the liver and extending beyond the diaphragm in the right hemi-thorax. This cyst was calcified in its inferior part and contained multiple daughter vesicles (Figure 1). The indirect immunofluorescence and the enzyme-linked immunosorbent assay (ELISA) test for the *E. granulosus* were significantly positive. A pre-operative Albendazol therapy (400 mg per day) for 3 months was indicated. The surgery was done through a midline laparotomy; no hepatectomy was done instead of that a protruding dome resection was performed just above the calcified part with aspiration and evacuation of its contents (liquid, membranes and the daughter cysts), taking the pre-caution to confine the operation site with H₂O₂ soaked compresses to avoid any spillage. There was no biliary fistula identified. The rent in the diaphragm was about 7 cm, made essentially from the fibrous hull or capsule of the superior part of the hydatid cyst without any bronchial fistula. We also found that the superior part of the fibrous capsule of the cyst was continuous with the diaphragm, preventing any communication between the thoracic and the abdominal contents. Our decision was to end the surgery just by a drainage of the remnant cavity (inter hepato-diaphragmatic space) without closing the diaphragmatic rent. We show you our surgical strategy by 4 diagrams (Sketches).

The post-operative course was uneventful. The patient remained asymptomatic after 24 months of follow-up; the recent CT scan showed no recurrences, also there was no negative impact of our decision to consider the fibrous capsule as a diaphragmatic closure (Figure 2).

**DISCUSSION**

The hydatid disease is a parasitic infection cause by the Echinococcus tapeworm. It has worldwide prevalence, especially in countries like Morocco where sheep rearing is carried out on a large scale. Although, the liver and the lungs are the most frequently affected viscera by the hydatid cyst, other organs such as the spleen, the kidneys, and the brain could also be affected.

The trans-diaphragmatic presentation where the he-

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**Figure 1:** CT Scan Images Showing the Trans-Diaphragmatic Hydatid Cyst. A) 1: Intrathoracic Extension of the Hydatid Cyst. B) 2: The Liver Hydatid Cyst Covering the Right Posterior Section of the Liver. 3: The Daughter Vesicle. 4: The Fibrous Capsule of the Cyst. C) Coronal Cut. 5: The Liver Hydatid Cyst. 6: The Calcified Part of the Cyst. 7: The Intrathoracic Extension through the Diaphragm. D) 8: The Sandglass Shape According to Gomez et al. 4

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Figure 2: Post-operative CT Scan Images Showing No Recurrences and No Negative Impact of our Decision of not Closing the Diaphragmatic Rent.

1. The fibrous capsule is continuous with the diaphragm.
2. Absence of any recurrences of the hydatid cyst.
3. A liver compensatory hyperthrophy.

Sketch 1: A) The Trans Diaphragmatic Hydatid Cyst. B) The Diaphragm. C) The Right Lung. D) The Diaphragm Rent. E) Daughter Vesicles.

Sketch 2: Aspiration and Evacuation of the Hydatid Cyst Content.

Sketch 3: Resection of the Protruding Dome without Performing any Hepatectomy.

Sketch 4: Drainage of the Remnant Cavity without Closing the Diaphragmatic Rent Defect.
The hydatid cyst may evolve in many organs separately. The synchronous trans-diaphragmatic extension of a hepatic hydatid cyst to the right lung is uncommon. In the literature, the one stage trans-diaphragmatic approach for the liver cyst through a right thoracotomy (7th-8th intercostal space) is highly recommended, trans-diaphragmatic approach for the liver cyst through a right laparotomy; The pulmonary cyst isn’t voluminous or complicated; An absolute indication for laparotomy; The pulmonary cyst isn’t voluminous or complicated; Absence of pleural adhesions; The pulmonary cyst is reachable by a trans-diaphragmatic approach through laparotomy (the right lower lung lobe).
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