Case Report: Cardiac Manifestation of Cystic Echinococcosis: Comparison of Dual-Source Cardio–Computed Tomography and Cardiac Magnetic Resonance Imaging and Their Impact on Disease Management

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Abstract. We report a rare case of cardiac manifestation of cystic echinococcosis in a young Turkish patient. The patient had a history of cardiac surgery caused by a spontaneously ruptured cardiac mass that was intraoperatively diagnosed as a manifestation of cystic echinococcosis. Spread of the disease occurred in the lower mediastinum and pericardium. The patient was treated with antihelmintic medication in the postsurgical course. Follow-up was performed by cardiac magnetic resonance imaging (MRI) and dual-source cardiac–computed tomography (CT). We present the advantages and limitations of both imaging modalities in diagnosing cardiac manifestations of cystic echinococcosis and discuss their impact on therapy planning. We conclude that cardiac MRI and dual-source Cardio-CT contribute in a complimentary way to diagnosing and assessing cyst activity and extend of disease. Imaging plays a major role in the management of this disease because it can detect a response to antihelmintic medication or identify possible treatment options.

A 33-year-old Turkish man came to our institution for consultation of cardiac cystic echinococcosis. He had a history of open heart surgery in 1998 because of a cardiac tumor. Intraoperatively, the mass was identified as a ruptured hydatid cyst and cystic fluid had spilled into the lower mediastinum and pericardium. The patient was treated with albendazole and followed-up with cardiac magnetic resonance imaging (MRI), which showed cystic formations 1) rетrosternally and anterior of the right ventricle in the lower precordial mediastinum, 2) at the apex of the left ventricle on the epicardium, and 3) at the base of the left ventricle near the valvular plane infiltrating the myocardium (Figure 1).

The first and third locations show active multicystic lesions with liquid content demonstrated by T2-weighted MRI representing type CE2 cysts following the classification of the World Health Organization (Figure 1).1,2 The manifestation at the apex of the left ventricle showed inactive cysts with solid transformation (type CE4 cyst). The first and second locations are extracardial whereas the third location presents a cyst infiltrating the myocardium. During a follow-up period of two years, the cystic manifestations did not respond to albendazole therapy. The intramyocardial cyst persisted as an active World Health Organization stage CE2 cyst.

The patient was then evaluated by dual source cardiac–computed tomography (CT) to assess possible surgical treatment options. Dual source cardiac-CT showed that the myocardial layer is thinned by the intramyocardial cyst, which bulges out the fine layer of the endocardium into the left ventricle and represents a cyst at a high risk of rupture (Figure 2). Calcification was detected in the cystic formation at the apex of the left ventricle as a sign of involution (Figure 1).

In an interdisciplinary conference with tropical medicine physicians, cardiovascular surgeons, and radiologists, the image findings of both modalities were evaluated. It was concluded that the cystic formation in the myocardium is at high risk for rupture.3 The intramyocardial cyst is close to the mitral valve and would cause an extensive myocardial defect if removed. The reconstruction in a re-operation would be difficult in a situs with scar tissue formation, which would increase the risk of cyst rupture. In the case of cyst rupture, the hydatid fluid would likely cause an acute anaphylactic reaction and systemic, as well as local pericardial spread of the disease. It was also believed that albendazole treatment carries the risk of cyst rupture because of weakening of the cyst wall induced by pericystic inflammation.

Modern imaging techniques play a major role in diagnosing of hydatid cysts and defining stages of evolution. Pathognomonic signs such as the double–line sign, hydatid sand, honeycomb pattern in multivesicular cysts, daughter cysts, and the water-lily sign help to establish the diagnosis.4,5 Consolidation and calcification of the cyst wall and content is considered a sign of inactivity. MRI with its excellent soft tissue contrast is able to depict the architecture of the cyst wall and content but has low sensitivity for the detection of calcification. However, CT can visualize and quantify calcification of the cysts. In this case, CT was beneficial because of its ability to image a cardiac cycle and the whole cardiac region with high spatial and temporal resolution, which offered the possibility of precise three-dimensional reconstructions (Figure 3). MRI offers high temporal resolution but inferior spatial resolution compared with CT. In comparison with CT, MRI has the following limitations: artifacts (e.g., breathing, motion, metal parts), lower spatial resolution, discontiguous image data acquisition, and insufficient three-dimensional reconstructions (Table 1). In combining the information of both modalities, assessment of clinically relevant features of cysts can be improved by showing the true extent of the disease and a cyst at high risk for rupture by CT and the stage of the cyst by MRI, which reflects parasitic activity.

In our case, evaluation of the various cystic lesions by both imaging modalities led to the conclusion that surgery was not a treatment option. The risk of cyst rupture during the re-surgery in an operating field with scar tissue formation from previous thoracotomy was believed to be unacceptably high. However, without surgery the patient also remains at risk for rupture of the intramyocardial cyst.
In cystic echinococcosis, CT and MRI are complementary, valuable tools in the diagnosis and management of this disease. Particularly in cardiac hydatid disease, therapeutic decisions should be based on both imaging modalities. High-resolution visualization is needed to evaluate the surgical approach and to identify possible contraindications for surgery.

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**Table 1**  
Comparison of cross-sectional imaging (CT and MRI) and their advantages (+) in diagnosing and monitoring cystic echinococcosis*

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<th>MRI</th>
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<tr>
<td>Tissue contrast</td>
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<td>Evaluation of cyst wall and content</td>
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<td>Detection of calcification</td>
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* MRI = magnetic resonance imaging; CT = computed tomography.

**Figure 1.** A, Axial computed tomography (CT) scan and B, magnetic resonance imaging (MRI) (T2w HASTE) on the level of the caudal part of the heart and the dome of the diaphragm. High-intensity on T2-weighted MRI shows fluid content of the cystic lesion (*) in the posterior wall of myocardium at the base of the left ventricle (B). Partly liquid (arrowhead) and partly consolidated (concave arrowheads) cystic lesions anteriorly at the right ventricle and posteriorly at the caudal aspect of the sternum. Calcification of the lesion (arrow) at the apex of the left ventricle is shown by CT (A) with only marginal fluid content. These cysts show that cyst content can be better characterized by MRI but calcifications can be better visualized by CT scan.

**Figure 2.** A, Long axis view of a computed tomography (CT) reconstruction and B, corresponding plane on magnetic resonance imaging (MRI) (cine trufi or steady-state free precession). Both modalities show infiltration of the posterior wall of the left heart replacing the myocardial layer at the base of the heart by the cystic lesion (*). In comparison with MRI, only the high resolution of the CT scan shows a more precise image of the hydatid cyst with only a thin layer of endocardium bulging out into the left ventricle (LV), which indicates a high risk of rupture.

**Figure 3.** Three-dimensional cardiac–computer tomography (CT) reconstruction in gray scale with A, a thick slab and B, color-coded with a thin slab. High spatial and temporal resolution of dual-source cardio-CT enable more precise visualization of the infiltration of the cystic lesion (*) into myocardium, which shows that only a thin (color coded in blue) (B) endocardial layer is separating the cyst from the left ventricle cavity, which indicates a high risk of rupture. PA = pulmonary artery; Ao = aorta; LV = left ventricle. This figure appears in color at www.ajtmh.org.
REFERENCES


