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# Surgical Treatment of Right Ventricular Hydatid Cyst

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## ABSTRACT

Hydatid cyst is a serious endemic parasitic disease found in cattle-raising areas of the world. Cardiac hydatid cysts are rare and appear in 0.5% to 2% of hydatid cyst cases. A 24-year-old male patient was admitted to the hospital because of chest pain. A cystic mass (4 4 3 cm) was demonstrated with transthoracic echocardiography, computed tomography, and magnetic resonance imaging. A hydatid cyst was located in the right ventricular wall near the inferior branch of the acute marginal branch of the right coronary artery and was located such that it pushed the tricuspid valve inward. The cystic materials were removed with the patient on cardiopulmonary bypass. The surgery for cardiac hydatid disease is safe, and the results are satisfactory.

## INTRODUCTION

Hydatid cyst is a serious endemic parasitic disease found in the cattle-raising areas of the world. The larva of Echinococcus granulosus causes the disease in humans. The first description of cardiac hydatid disease was given in 1846 by Griesinger. Although Marten and De Crespign made the first surgical therapeutic effort in 1921, the first successful treatment without the use of cardiopulmonary bypass was reported by Long in 1932. In 1962, Artucio and colleagues reported the first case of cardiac hydatid cyst to be treated with open heart surgery [Artucio 1962; Tellez 1976]. Patients usually have hydatid cysts in the liver (65%) and the lungs (25%); cardiac cysts are rare and occur in 0.5% to 2% of cases [Dighiero 1958]. Cardiac cysts are most commonly located in the left ventricle (55%-60%), followed by the right ventricle (15%), the interventricular septum (7%-9%), the left atrium (8%), the right atrium (3%-4%), and the pulmonary artery (7%) [Rémadi 1994; Yaliniz 2006]. Surgery is the only procedure used for treatment [Thameur 2001].

## CASE

A 24-year-old man with chest pain was admitted to the outpatient clinic. The electrocardiography (ECG) results were normal. A physical examination revealed a 2/6 systolic murmur. Moderate regurgitation of the tricuspid valve and a cystic mass (4 4 3 cm) in the lateral wall of the right ventricle were observed by transthoracic echocardiography. The serologic tests for hydatid disease were normal. Evaluations by computed tomography (CT) (Figure 1) and magnetic resonance imaging (MRI) (Figures 2 and 3) confirmed the diagnosis of the presence of 4 4 3–cm multiseptal cystic tissue in the lateral wall of the right ventricle. No cysts were found in any other organs. We administered 10 mg oral diazepam for premedication the night before the operation and 1 hour before anesthesia induction. Anesthesia induction was achieved with 0.3 mg/kg etomidate, 0.1 mg/kg vecuronium, and 5 µg/kg fentanyl.

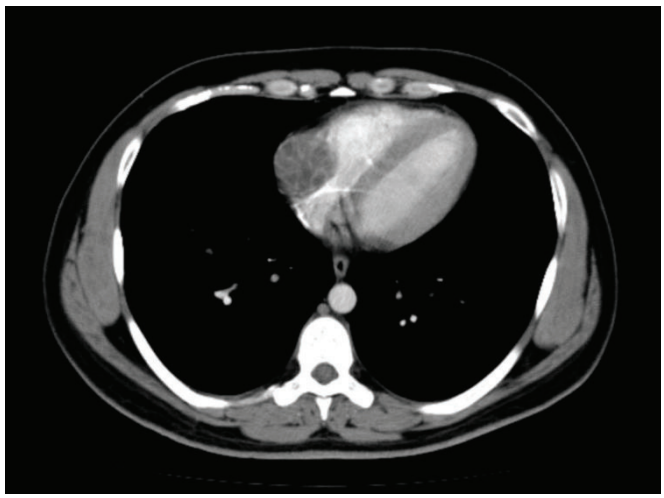

Figure 1. Computed tomography image of a cardiac hydatid cyst.

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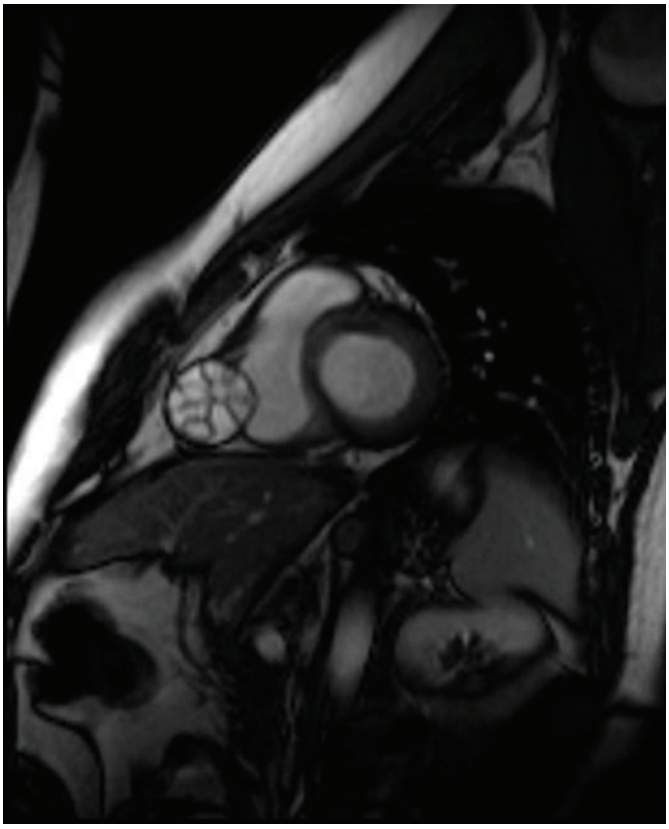

Figure 2. Magnetic resonance imaging of a transverse section of a cardiac hydatid cyst.

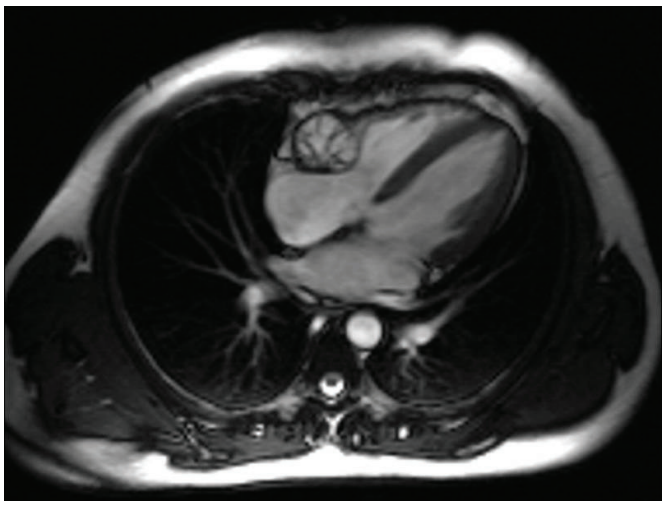

Figure 3. Magnetic resonance imaging of a sagittal section of a cardiac hydatid cyst.

Anesthesia was maintained with propofol (3-4 mg/kg per hour), remifentanil (0.15-0.25 µg/kg per minute), vecuronium, and an oxygen-air mixture (40%-60% oxygen). Central venous cannulation was performed via the right femoral vein because of the risk of perforating the cyst with cannulation of the right internal jugular vein. Open heart surgery was performed with the patient on cardiopulmonary bypass via bicaval venous cannulation. The contents of the cyst were first aspirated, and there seemed to be no blood. The ascending aorta and the main pulmonary artery were cross-clamped, and a right atriotomy was performed. Before aspiration, we placed previously prepared gauze pads with 20% saline near the cyst cavity to prevent the introduction of free solices to cardiac structures. A hypertonic saline solution (20%) was injected into the cyst cavity. After the right ventriculotomy, we removed all of the cystic materials, including approximately 38 to 41 daughter cysts (dimensions, 4-22 mm) (Figure 4) and the membranes, and the cavity was irrigated with 20% hypertonic saline solutions. The residual cavity was closed via capitonnage. The right ventriculotomy was closed by using Teflon felt, and the tricuspid valve appeared normal with no insufficiency. The right atrium was closed primarily. The postoperative period was uneventful. The histopathology analyses confirmed the diagnosis of a hydatid cyst, and the patient was administered 15 mg/kg albendazole at the 2-month follow-up.

Figure 4. Daughter cysts removed from the cystic cavity.

## DISCUSSION

Hydatid disease is a serious endemic disease in the Eastern Mediterranean, South America, the Pacific, the Middle East, and the Far East [Ahmed 2002]. The reported incidence of hydatid disease in Turkey is 3.4 cases per 100,000 people [Tuncer 2010]. Primary cardiac hydatid cyst is rare, and hydatid cysts occur most commonly in the liver and lungs [Tiryakioglu 2009]. Dogs are the definite host, sheep are the intermediate host, and humans are the accidental host. The larva of E granulosus causes the disease [Kammoun 2000], and it is commonly accepted that hydatid cysts reach the heart via the coronary arteries [Deve 1949].

A cardiac hydatid cyst produces a number of symptoms, ECG findings, and complications. In the early period, a cardiac hydatid cyst is asymptomatic and may be discovered by routine means. Some patients are symptomatic, and chest pain, dyspnea, hemoptysis, cough, palpitations, fever, and syncope can be observed. Our patient complained of chest pain [Thameur 2001]. ECGs show arrhythmias, atrioventricular block, bundle

branch block, and ischemic findings [Niarchos 2007]. Our patient's ECG was normal. Some complications can be caused by compression, infiltration, and rupture of neighboring tissues. Valvular dysfunction, pulmonary hypertension, myocardial ischemia and infarction, cardiac tamponade, pulmonary embolism, arterial occlusion, and anaphylactic shock may occur [Niarchos 2007]. Damage to the valves may cause cardiac murmurs and clinically simulate valvulopathies [Miralles 1994]. Our patient had moderate tricuspid valve regurgitation and a systolic murmur. After the cystectomy, we checked the tricuspid valve, and the valvulopathy was gone.

Serologic tests are important and have the capability of leading to a diagnosis when the results are positive. In the long run, serologic tests are important for detecting recurrence after surgery. Hypereosinophilia may be seen in some patients, but it is not specific for the presence of hydatid cysts [Ben-Hamda 2003]. Echocardiography can reveal the presence of cysts, cardiac chambers, and obstruction or deformation of valves and the ventricular-ejection pathways [Thameur 2001]. Transesophageal echocardiography is easily performed and has a high sensitivity for detecting cardiac hydatid cysts. CT scans are better than echocardiography evaluations, and other locations (cerebral, thoracic, and abdominal) can be examined by CT. MRI is a more reliable diagnostic procedure and can produce images clearly and in slices comparable to the resolution of CT, but in multiple anatomic planes and without the use of contrast material.

Surgical procedures can be performed with or without cardiopulmonary bypass, with some authors reporting having performed the surgical resection without cardiopulmonary bypass [Birincioğlu 2003]. Kaplan and colleagues have recommended clamping the pulmonary artery to prevent pulmonary embolization in cases of right-sided hydatid cysts [Kaplan 2001]. In our case, we clamped the pulmonary artery with the ascending aorta because our patient's cyst was in the right ventricle wall.

## CONCLUSIONS

Cardiac hydatid cyst is rare but serious. The diagnosis is difficult because of the long latency between infection and manifestation of the disease and because the symptoms are nonspecific. Early surgery for cardiac hydatid disease is safe, and the results are satisfactory.

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