Perioperative Management of Intramyocardial Hydatid Cyst with Off-pump Technique

Abstract
Cardiac echinococcosis is a rare disease. Depending on the location of hydatid cyst in the heart, clinical presentation can be an asymptomatic case or lethal stroke, arrhythmias, valvular dysfunction, cardiac tamponade, cardiac failure, shock, and even death. Treatment of choice for cardiac hydatid cysts is surgical excision, even in an asymptomatic patient. We present a case report of an asymptomatic case of off-pump removal of intramyocardial hydatid cyst. A 21-year-old male presented asymptomatically and was diagnosed with a hydatid cyst incidentally during a regular checkup. Echocardiography and cardiac computed tomography angiography images demonstrated an intramyocardial hydatid cyst on the lateral aspect of the left ventricle with slight extension over the anterior and posterior regions. Important aspects of diagnosis and management specific to cardiac hydatid cyst along with the review of literature have been discussed.

Keywords: Intramyocardial hydatid cyst, off-pump technique, surgical management of intramyocardial hydatid cyst

Introduction
Hydatid cyst is an endemic infestation disease in various regions in the world. Echinococcus granulosus, the causative agent of cystic hydatid disease, usually (60%–70%) reaches the liver through intestinal veins or lymphatics. If embryos bypass the liver and the lung, they reach the systemic circulation and may affect any organ of the body. Cardiac involvement is in 0.02% to 2% of all hydatid diseases.1,2 The embryos can reach the myocardium through coronary circulation from the left side of the heart. The most common locations of cardiac hydatid cysts are the left ventricle (LV), interventricular septum, and right ventricle (RV).3 Cardiac symptoms (mostly chest pain, shoulder pain, dyspnea, and persistent cough) usually depend on the localization and size of the cyst. The cyst may also grow between cardiac fibers without causing any symptoms. If it reaches a reasonable size, fever, palpitation, arrhythmias, and heart failure may develop. The most critical complication of a cardiac cyst is perforation with a high incidence ranging between 25% and 40%. After perforation of the cyst, 75% of patients die from septic shock or embolic complications.

Case Report
A 21-year-old male presented asymptomatically without any clinical sign and a nonspecific medical history. X-ray chest posteroanterior view showed asymmetrical cardiomegaly [Figure 1]. Transthoracic echocardiographic examination revealed that an intramyocardial hydatid cyst involved the anterior, posterior, and free lateral walls of the LV [Figure 2]. The left ventricular end-systolic and end-diastolic diameters were reduced. The rest of the echocardiographic variables were unremarkable. A smooth-surfaced cystic mass of 90 mm × 60 mm at the left ventricular lateral wall was also seen on cardiac computed tomography (CT) angiography [Figures 3 and 4]. The mass was localized inside the myocardial fibers. Figure 4 shows proximity of cyst with the left anterior descending (LAD) artery. There was no contrast intake inside the mass; the left ventricular volume was decreased due to bulging of the mass. No other cyst was detected in the body of the patient. His preoperative hematology and biochemistry investigations were within normal range. The patient was scheduled for off-pump removal of cardiac hydatid cysts. Intraoperatively, electrocardiography, pulse oximetry, EtCO₂, invasive blood pressure monitoring, and temperature were continuously monitored. The surgery was done under off-pump conditions. The entire operation was completed in 2 hrs. The patient was shifted to the intensive care unit and later to the ward. He was discharged without any complications on the 5th day after the surgery. He was under regular follow-up at the clinic and was asymptomatic when last seen in the clinic.
pressure (IBP) monitoring, central venous pressure (CVP) monitoring, and urine output and temperature monitoring were done. After securing an intravenous (iv) access with 16 G cannula in the right limb, left radial artery cannulated for IBP monitoring and right internal jugular vein cannulated for CVP monitoring. The patient was induced with iv injection midazolam 1 mg, iv injection fentanyl 100 microgram, and iv injection etomidate 8 mg and intubated with iv injection rocuronium 50 mg. Anesthesia was maintained with iv injection propofol infusion and intermittent iv injection vecuronium boluses. Heart was approached with left anterolateral thoracotomy. Stand-by cardiopulmonary bypass was considered for any intraoperative hemodynamic deterioration. After pericardium reflection, the mass with its pale yellow daughter cysts was visible [Figure 5]. The affected area was encircled with polyvinylpyrrolidone-iodine-embedded gauzes. After checking with a diagnostic aspiration to identify if there is any communication between cyst cavities and cardiac chambers, polyvinylpyrrolidone-iodine solution was injected into cysts to inactivate the scolices. The fluid content of the cysts was then aspirated, and the cavity was carefully opened. Multiple daughter cysts were removed [Figure 6]. Daughter cysts were best mobilized with a tablespoon. The area was then irrigated. Epicardium covering the cyst cavity was excised and the cavity was left open. He was discharged successfully 7 days after the surgery. During follow-up visits, he had no fresh complaints and echocardiography parameters were in normal range.

**Discussion**

Cardiac echinococcosis is a rare disease, which may involve almost any part of the heart, most often located in ventricular myocardium. Two-dimensional
echocardiography and cardiac CT imaging are diagnostic modalities of choice, in a suspected case. Treatment differs depending on the location and the complications. In their case series of 10 patients of off-pump removal of intracardiac hydatid cyst, Birincioglu et al. concluded that ventricular myocardial echinococcosis without relation with the cardiac chambers can be operated without using cardiopulmonary bypass with the aid of transesophageal echocardiography and controlled cyst fluid aspiration. They also suggested that during off-pump surgery, myocardial contractions help to expel the daughter cyst once the overlying myocardium has been dissected. It is especially useful when the cyst is located close to coronary arteries.

In a long-term study done over 11 years at Rajaie Heart Center, Tehran, average age of the patients was 36 ± 3.2 years – 61.5% were female and 38.5% were male. Dyspnea was the most common symptom followed by dysrhythmia. The most common sites of cardiac involvement were interventricular septum (46%), followed by right atrium (15.3%), LV free wall (15.3%), pericardium (7.7%), RV free wall (7.7%), and left atrium (7.7%). The overall effect can give rise to symptoms such as those associated with the compression of a coronary artery, with a disturbance in the valvular mechanisms (clinically simulating mitral, pulmonary, aortic, or tricuspid valve stenosis or regurgitation), or with outflow tract obstruction or a variety of conduction defects (caused by the involvement of the interventricular septum). An anaphylactic reaction and profound circulatory collapse may follow intracavitary rupture. Acute stroke as a presenting symptom of cardiac hydatid disease is exceptionally rare, and only a few cases have been reported in the literature. As in our case, treatment of choice even for asymptomatic cardiac hydatid cysts is surgical excision, which yields complete recovery and excellent prognosis. Resection under cardiopulmonary bypass, since 1962, has been considered the safest method, with the least risk of spillage of cyst contents during the procedure. It is advisable to place an additional filter on the venous side of the circuit to prevent the passage of hydatid particles to the pump, especially in rupture cases. Perioperative anaphylactic shock, arrhythmias, myocardial ischemia, tamponade, and germinative membrane embolization causing hemodynamic deterioration are the potential challenges to be kept in the mind while managing even an asymptomatic case. Supplemental medical therapy with mebendazole or albendazole is recommended to reduce the risk of recurrence, especially in the event of intracardiac rupture. To exclude the possibility of recurrence due to inadvertent spillage or a small cyst not noticed at the time of the operation, serologic and echocardiographic monitoring is recommended during the first 5 postoperative years.

**Conclusion**

Intramyocardial cysts are rare kind of zoonoses. Cystic lesion in the left ventricular free wall, not communicating with the left ventricular cavity, has been excised successfully in the right lateral position with anterolateral thoracotomy, supine position with median sternotomy has an advantage of access to central as well as peripheral cannulation sites for emergency cardiopulmonary bypass if needed along with adequate exposure.

**Declaration of patient consent**

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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