

Interventricular septal hydatid cyst: Transesophageal echocardiography as a therapeutic tool during bypass

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ABSTRACT

Cystic echinococcosis (hydatid disease) arising from infestation with a larval or adult form of the *Echinococcus granulosus* tapeworm is endemic in certain states of India, but affecting interventricular septum (IVS) solitarily is a scarce phenomenon. We present a rare case of transesophageal echocardiography guided management of IVS hydatid cyst even during cardiopulmonary bypass, which presented with a rather unusual complaint of repeated syncope.

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INTRODUCTION

Cystic echinococcosis (hydatid disease), a human and animal endoparasitic infestation by *Echinococcus granulosus* tapeworm, is endemic in various livestock-raising countries including India (highly prevalent in Kashmir, Andhra Pradesh, Tamil Nadu, and Central India [Eastern Uttar Pradesh]).^[1] The parasite, in its eugenic stage lives in the intestines of carnivorous animals (the definitive hosts-dog, wolf, etc.) while small cattle and human beings-the incidental hosts, harbor the slug stage by accidental ingestion of ova in food and water contaminated with dog feces. Though liver is the most common site of occurrence, cardiac echinococcosis is a rare presentation (0.01–2% of all reported cases)^[2] and more so rare is the real-time transesophageal echocardiography (TEE) based surgical management of the same.

CASE REPORT

A 52-year-old female patient visited our Cardiology Outpatient Department with the complaint of recurrent presyncope episodes for 15 days, and one episode of syncope without any associated chest pain, palpitations, pedal edema, and oliguria. Her past medical and surgical history were insignificant. Barring her

cardiovascular examination, which revealed the presence of Grade 2 left parasternal heave, and soft ejection systolic murmur in pulmonary area and along left sternal border; her general, and systemic examination was normal with arterial blood pressure of 102/55 mmHg, 105 beats/min heart rate, 94% SpO₂ on room air at respiratory rate of 16 breaths/min.

When investigated, her chest X-ray was unremarkable except for cardiomegaly; electrocardiogram (ECG) revealed symmetrical T wave inversion in II, III, aVF, and V–V6 leads; computed tomographic (CT) angiogram revealed normal coronaries and a large well defined interventricular septal (IVS) mass lesion (9 cm × 8 cm) with uniform

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internal hypodensity compressing both ventricles, suggestive of hydatid cyst, without mediastinal, and any other organ involvement; magnetic resonance imaging (MRI) revealed nonenhancing cystic IVS mass (7.8 cm × 6 cm × 6.2 cm) with septae, and a possible daughter cyst within compressing both ventricular cavity (left > right) suggestive of hydatid cyst and minimal pericardial effusion (PE); transthoracic echocardiogram (TTE) revealed 9–10 cm IVS mass with central cyst almost obliterating both ventricular cavities with minimal PE and no regional wall motion abnormality while ejection fraction was 60%.

The enzyme linked immunosorbent assay (ELISA) was positive for immunoglobulin G *Echinococcus* antibodies and confirmed the diagnosis of hydatid disease and was planned for pericystectomy on cardiopulmonary bypass (CPB). She was premedicated with injection morphine 4 mg i.m. and injection promethazine 25 mg i.m. half an hour before shifting to operation theatre (OT). In the OT routine monitoring including noninvasive blood pressure (IBP), ECG, and pulse oximetry were established. Intravenous line was secured with a 16 F cannulae and using etomidate-opioid-muscle relaxant technique general anesthesia was induced followed by left radial artery cannulation using 20 F cannulae for IBP monitoring and right internal jugular vein cannulation for monitoring central venous pressure.

Following median sternotomy and pericardiotomy to establish CPB and cardioplegic arrest, hypertonic saline soaked sponges were dispersed throughout the pericardial cavity to prevent parasitic dissemination and invasion. An additional filter was placed on the venous side of the CPB circuit to prevent accidental passage of hydatid particles to the pump, anticipating cyst rupture. After about 40 min, when the efforts to approach the cyst through the right ventricle (RV) through tricuspid valve did not pay off, we decided to perform TEE (two-dimensional, chrome map, and three-dimensional imaging) using Phillips iE33 xMATRIX Echocardiography System™ (Andover, MA, USA) even during CPB to help precisely localize the cyst and provide optimal access, keeping note of the TEE probe temperature, not allowing it to heat up beyond 40°C by freezing the interrogation when not required.

In view of cramped RV and large dilated IVS on TEE [Figure 1], we deliberated for an alternate approach for cyst excision. Henceforth, surgeons decided to

reach the cyst directly through IVS without further opening any nearby cardiac chambers, and an incision parallel and medial to the left anterior descending coronary artery was made. Entire cyst contents were aspirated; the cavity was washed with a hypertonic saline solution and capitonnage was performed. With the aid of TEE, resection of adjoining septae was done preventing any iatrogenic septal damage leading to the septal defect, conduction abnormalities etc., [Figure 2 and Supplementary Video 1] for *en bloc* cyst removal.

There were no arrhythmia episodes post-CPB, and sinus rhythm was restored. The patient was shifted to Intensive Care Unit and managed by intensivists after that as per institutional protocol including chemotherapy with albendazole.

DISCUSSION

Cardiac echinococcosis is an exceptional occurrence,^[2] but when it does, left ventricle (LV) is the most commonly reported site (55–60%) when the parasite penetrates both hepatic and lung filters to gain access to coronary circulation, with solitary IVS invasion being very rare (4–10%).^[3] Cardiac hydatid cysts rarely present in early childhood owing to its slow growth and the presentation depends on the age, size, location, and integrity of the cyst, varying from: Incidental detection during any imaging examination, symptoms due to mechanical complications (valvular stenoses or regurgitation, pericarditis, congestive failure, tamponade, or ischemia by coronary compression) to disturbances of cardiac rhythm, or complications due

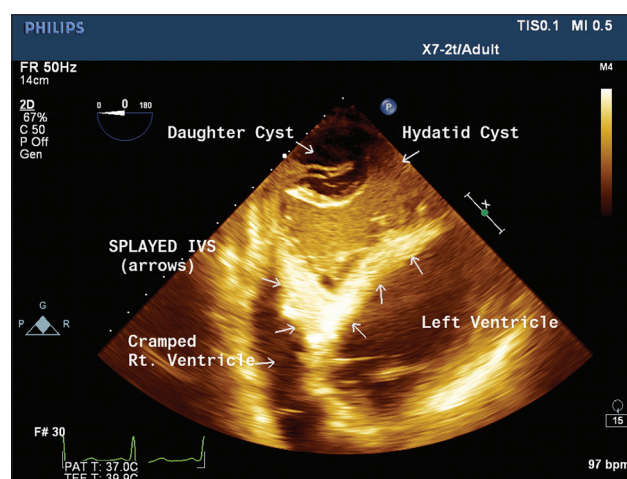


Figure 1: Transthesophageal echocardiogram. Deep transgastric view chrome map shows splayed interventricular septum containing hydatid cysts and cramped right ventricle

to cyst rupture (systemic emboli, anaphylactic shock, or pulmonary embolus).^[4] While our patient presented with repeated syncope episodes; cough, chest pain, palpitations, and dyspnea are usually the common symptoms, with no specific clinical picture to lead to the correct preoperative diagnosis. Hence, clinical suspicion is crucial for early detection of cardiac hydatid cysts, especially in endemic areas.

ELISA is one of the most sensitive serologic tests that when positive for *Echinococcus* antibodies confirms the diagnosis.^[5] Chest radiographs can be normal or abnormal, but ECG findings vary corresponding to the cysts location and are usually not diagnostic.^[5] It is imperative to determine the size, number, and location of the cysts for a successful surgical outcome. Echocardiography, being reliably informative, easy-to-perform, and efficient is the diagnostic modality of choice for cardiac echinococcosis, while CT and MRI provide additional information, about the extent and anatomic relationships of the cysts. On echocardiography, the young cyst looks anechoic with well delineated fluid content while the old cyst appears as dense echo zones (from daughter vesicles, trabeculations, and calcifications) along with anechoic zones, as in our patient.^[6]

In spite, surgical excision on CPB taking standard precautions being the treatment of choice since 1962 for cardiac hydatid cysts with 20–40% risk of sudden rupture leading to death both pre- and intra-operatively (during cannulation for CPB) because of its fragile nature, utmost care is required in surgical removal of the cyst.^[3,4,7,8]

TEE has been reported to provide essential additional information, especially when cysts: Are multiple, as small as ≤ 0.5 cm that were not diagnosed prior to surgery and large enough to obtain satisfactory TTE view (akin our patient wherein on contrary to TTE finding, LV was not as much compressed by the cyst as RV with left end diastolic volume of 50 mL [Figure 3]).^[7] Moreover, after 40 min of CPB time when cyst could not be reached through trans right atrium-RV approach, not only TEE guided alternate approach helped limit the clamp time to just over 90 min by providing optimal access to the cyst, recognizing conjunction with heart structures, to control surgical instruments location for complete cystectomy; it also helped minimize myocardial and septal trauma, hemorrhage, and damage of the heart structures.

Even though there are reports citing diagnostic utility of TTE,^[3-7] only few reports have elaborated diagnostic and therapeutic role of TEE.^[6] However, after thorough search in available online literature we could not find a single description of therapeutic TEE guided cystectomy during CPB, which is why we reported this case to highlight the therapeutic role of TEE during CPB.

CONCLUSIONS

Interseptal cardiac echinococcosis is rare and may even present with multiple syncope episodes and is complicated by serious complications including sudden death and hence, the possibility of hydatid disease should not be ignored especially in endemic areas. Although, TTE, CT, and MRI are diagnostic enough, the role of TEE cannot be ignored in complimenting

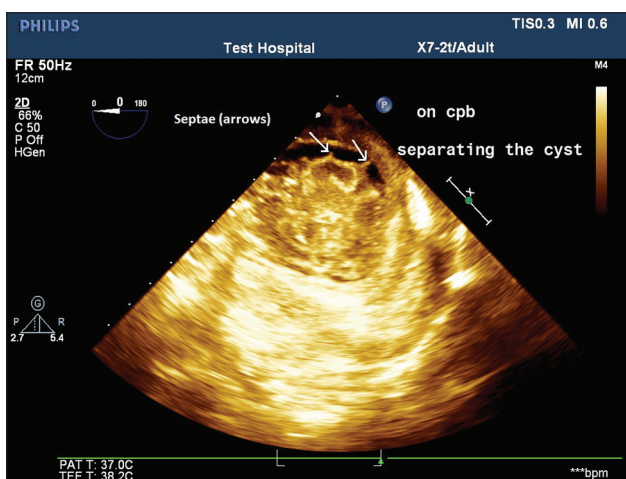


Figure 2: Transesophageal echocardiogram. Deep transgastric view chrome map shows interventricular septum hydatid cyst with septae on cardiopulmonary bypass

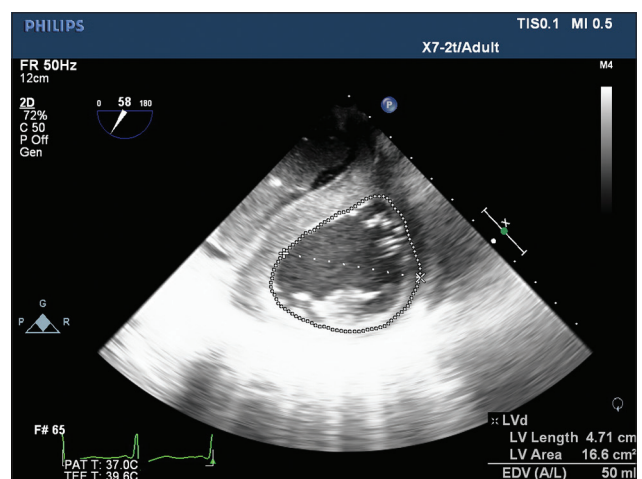


Figure 3: Transesophageal echocardiogram. Two-dimensional deep transgastric view showing measured left ventricle dimensions

and authenticating preoperative diagnosis, as well as intra-operative management, of the cardiac cyst on CPB.

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Conflict of interest

There are no conflict of interest.

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