



# Perioperative Evaluation of Heart *Echinococcus* Cyst in a 14-Year-Old Child

Saimir Kuci<sup>1\*</sup>, Alfred Ibrahim<sup>1</sup>, Shaban Memeti<sup>2</sup>, Stavri Llazo<sup>1</sup>, Ervin Bejko<sup>1</sup>, Klodian Krakulli<sup>3</sup>, Edvin Prifti<sup>3</sup>

<sup>1</sup>Department of Cardiac Anesthesia, Mother Teresa University Hospital Center, Tirana, Albania; <sup>2</sup>University Clinic of Paediatric Surgery, Faculty of Medicine, Ss Cyril and Methodius University of Skopje, Skopje, Republic of Macedonia; <sup>3</sup>Department of Cardiac Surgery, Mother Teresa University Hospital Center, Tirana, Albania

## Abstract

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**\*Correspondence:** Saimir Kuci, Department of Cardiac Anesthesia, Mother Teresa University Hospital Center, Rr. Dibrës 372, Tirana, Albania. E-mail: saimirkuci@gmail.com  
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**BACKGROUND:** Echinococcosis of the heart has a rate 0.02–2% of all hydatid diseases. Clinical presentation is depending of the location of hydatid cyst in the heart. Patients can be an asymptomatic case or lethal stroke, arrhythmias, valvular dysfunction, pulmonary edema, cardiac tamponade, cardiac failure, shock, and even death.

**CASE REPORT:** We present a case report, a 14-year-old child with 2 weeks of sore throat, whooping cough, subfebrile condition, sweating, fatigue and physical weakness, nausea, abdominal pain, and decreased appetite. He came to emergency room with cardiogenic shock and pulmonary edema. He was diagnosed with intramyocardial hydatid cyst.

**CONCLUSION:** Echinococcus cyst lesion in the LV in lateral wall, not communicating with the LV cavity, has been removed successfully with on-pump technique in a 14-year-old child. Median sternotomy was preferred and cardiopulmonary bypass has been considered the safest method. Supplemental medical therapy with albendazole is recommended to reduce the risk of recurrence.

## Introduction

Echinococcosis is a parasitic disease of tapeworms of the *Echinococcus* type. The two main types of the disease are cystic echinococcosis and alveolar echinococcosis. Less common forms include polycystic echinococcosis and unique cystic echinococcosis [1].

Cardiac involvement occurs in 0.02–2% of all hydatid diseases [3], [4] 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 on the left ventricle (LV), interventricular septum, and right ventricle (RV) [5]. Cardiac symptoms (mostly chest pain, shoulder pain, dyspnea, and persistent cough) usually depend on the localization and the size of the cyst. The cyst may also grow between cardiac fibers without causing any symptoms. If it reaches a reasonable size, fever, palpitation, arrhythmia, 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 died due to septic shock or embolic complications.

## Case Report

We present a 14-year-old child resident in Kukes (north of Albania) who comes to the emergency room of “Mother Teresa” University Hospital Centre of Tirana, with temp 39°C, shortness of breath, dyspnea, paroxysmal supraventricular tachycardia, AP-70/50 mmHG, FC-157 b/min, and metabolic acidosis.

### Anamnesis

He complained about 2 weeks of sore throat, whooping cough, subfebrile condition, sweating, fatigue and physical weakness, nausea, abdominal pain, and decreased appetite.

He transferred to cardiac intensive care unit (ICU) in a bad condition, with dyspnea low AP, FC-150 h/min, and no diuresis.

Immediately, we started therapy with O<sub>2</sub>, vagal maneuvers, dopamine 3,5 mcg/kg/min, and antibiotic.

- X-Rays: Detect enlargement of the heart, suspect pneumonia Figure 1.

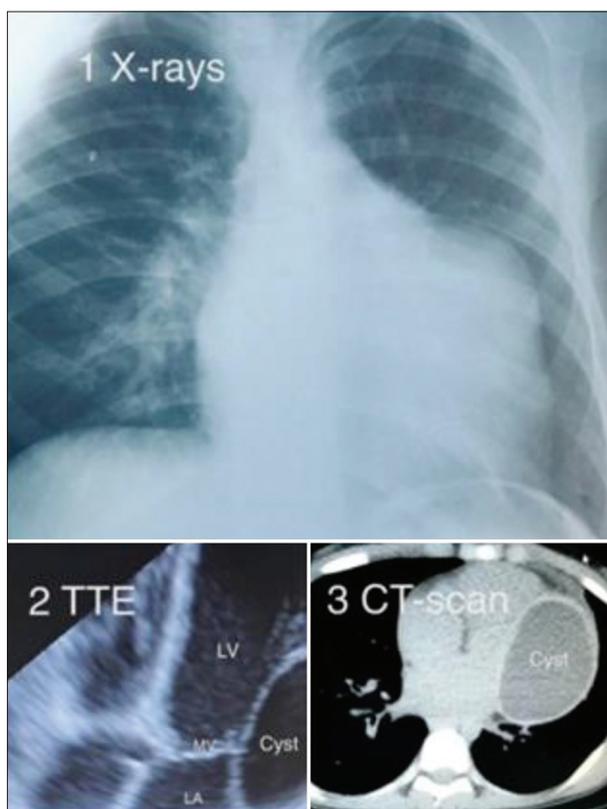


Figure 1: X-rays, transesophageal echocardiography, computed tomography-scan

- Transesophageal echocardiography (TTE): LV without kinetic disorders. It is observed an anechogenic formation probably cyst 83.5–67 mm around LV+Left atrium (LA). Advanced mitral regurgitation. Moderate tricuspid regurgitation, PSAP 45 mmHg, and normal RV. Without pericardial liquid Figure 2.

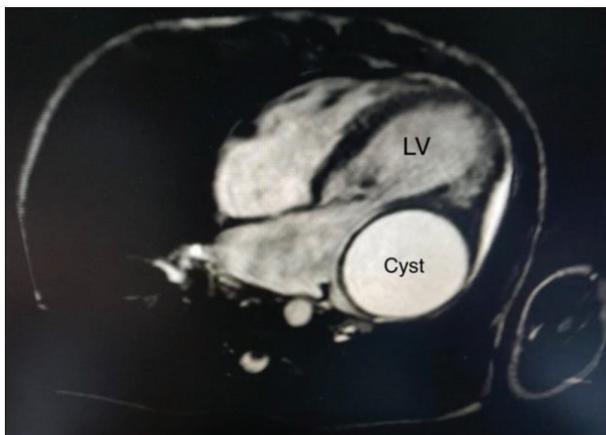


Figure 2: Magnetic resonance imaging-scan before procedure

- Thoracic-abdominal angio computed tomography (CT)-scan: Hypodense formation with liquid-density, which does not contrast after IV contrast, with dimensions 91 × 70 mm intramyocardial (between LA and LV). Minimum pericardial fluid 8 mm. Subpleural interstitial opacities in the right lung and superior sinister lobe, aspect in favor of interstitial pneumonia.

Free phrenic-costal sinuses. Hepar without focal lesions. Suprahepatic veins up to 8 mm. Free gallbladder and bile ducts. Lien, pancreas, adrenals are normal. The kidneys without stasis or calculosis. Regular bladder contours. No liquid in the abdomen Figure 3.

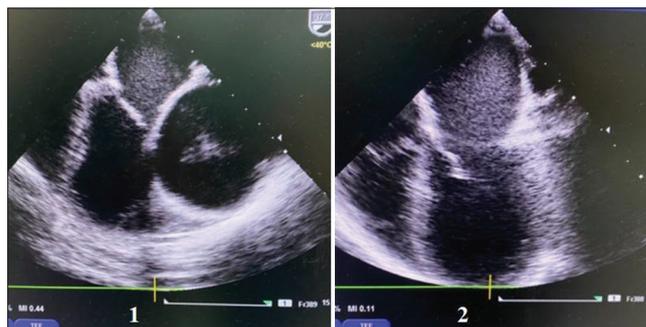


Figure 3: Intraoperator TEE

Laboratory analysis Gly-86mg/dl, Bun-42 mg/dl, Creatinine-0.8mg/dl, Totale Bilirubin-2.0mg/dL, AST-30u/l, ALT-35 u/l, LDH-206 u/l CK-41u/l, TSH-4.31 mui/l, PCR-7.77 mg/l, WBC-17.4 × 10<sup>3</sup>/μl, Lym-8.4%, Mon-2.5%, Gran-89.1%, RBC-5.17 × 10<sup>6</sup>/μl, Hb-14.9 g/dl, Hct-45.7%, PLT-211 × 10<sup>2</sup>/μl.

### Infectologist consultation

With the above clinical, imaging, laboratory data suspect bilateral Interstitial pneumonia caused by coronavirus disease 2019 (COVID-19). Polymerase chain reaction (PCR) test was performed.

Therapy with Ceftriaxone 1.0g × 2, Prednisolon 25 mg × 1, Dalteparine 5000 UI × 2 was started.

After 48 h, the patient was mostly afebril, temp 36.5–37.2°C. Episodes of tachycardia were not noticed.

Negative PCR test for COVID-19.

Magnetic resonance imaging (MRI)-scan suggests of LV *Echinococcus* myocardial cyst positioned behind the atrio-ventricular sulcus causing mitral valve regurgitation Figure 2.

Treatment: Albendazole 400 mg × 2, Enoxaparine 3000 UI × 2, Prednisolone 25 mg × 1, Metronidazole 0.5g × 3, Ceftriaxone 1.0g × 2, Furosemide 10 mg × 4, Vit C therapy, electrolyts.

After 1 week of therapy the patient was in a good condition, no temperature, no dyspnea.

Biochemical analysis results: Gly-77mg/dl, Bun-37 mg/dl, Creatinine-0.8 mg/dl, Totale Bilirubin-0.4 mg/dL, AST-54 u/l, ALT-83 u/l, WBC-8,7 × 10<sup>3</sup>/μl, Lym-8.4%, Mon-2.5%, Gran-89.1%, RBC-5.7 × 10<sup>6</sup>/μl, Hb-14.4 g/dl, Hct-46.7%, PLT-284 × 10<sup>2</sup>/μl.

### TTE

LV measuring 56/35 mm, EF ~ 66%, no changes in segmental kinetics. Moderate mitral regurgitation.

LA 20 cm<sup>2</sup>. Aortic valve with three thin cusps, normal gradient opening. Ascending aorta of normal size. Normal right chambers. Mild tricuspid regurgitation plus. SPAP ~ 40 mmHg. Formation in favor of a cyst measuring 70 × 70 mm in the anterolateral atrioventricular sulcus of the LV that compresses the LV. Pericardial fluid in the posterolaterally of the LV (5–6 mm).

After 2 weeks of medical treatment, we decided to remove surgically the cyst.

The procedure was performed under general anesthesia, propofol, fentanyl, pancuronium, and sevoflurane. On TEE was noted a compressed LV by the cyst and a deformed mitral valve with leaflet prolapse and moderate to advanced regurgitation (Figure 3). Surgery was performed: Echinococcal cyst resection and LV ventriculoplastic. The operation was performed on median sternotomy. A normal pericardium was present. After opening it, a cyst of the lateral wall of the LV was noted. Cardiopulmonary bypass was initiated using bicaval cannulae and an arterial cannula positioned in the ascending aorta. Antegrade crystalloid cardioplegia was used. The area in which the cyst was situated was isolated from the rest of the heart and the pericardial cavity with gauze packs. An incision was made. The cystic cavity was opened and aspirated. Cyst membranes were removed. The cavity had no communication with the ventricular cavity. The cavity was sterilized with povidone-iodine and was closed in layers not leaving any dead spaces. On TEE after cyst was removed, was noted LV total open, and mitral valve with mild regurgitation Figure 3.

The material of cyst was sent for histologic and bacteriological examination to confirm the diagnosis. Early post-operative period was good, he left the ICU after 2 days.

MRI-scan was performed, no residual signs of echinococcosis Figure 4.



Figure. 4: Magnetic resonance imaging-scan after procedure

### TTE

The LV was with preserved function. A 36 × 20 mm formation, which is not stained with blood from the

ventricle, was recognized. Mild mitral regurgitation was detected. Mild tricuspid regurgitation plus was noticed. SPAP was 35–40 mmHg. Minimal pericardial fluid in the postero-laterally of the LV was present. Small quantity of left pleural liquid and minimal in the right was found.

### Biochemical analysis results

Gly-125mg/dl, Bun-23 mg/dl,  
Creatinine-0.6 mg/dl, Total Bilirubin-20.3 mg/dL,  
AST-36 u/l, ALT-46 u/l, WBC-10.3 × 103/μl, RBC-  
4.52 × 106/μl, Hb-12,7 g/dl, Hct-37%, PLT-394 × 102/μl.

He left the hospital 7 days after the operation. Treatment in discharge: Albendazol, cardiospir, prednisolone, cefuroxime, and diuretic Control after 1 month demonstrated excellent outcome.

### Discussion

Hydatid disease is caused by the parasite *Echinococcus granulosus* which forms cysts. Ingested parasite embryo crosses the intestinal wall and reaches the portal circulation, where it is usually stopped. Those that escape may be entrapped in the pulmonary circulation. Therefore, the liver and lung are typical locations of the cysts. Rarely, it can reach to systemic circulation and may infest any organ. The hydatid disease may cause life-threatening complications such as anaphylactic shock, hemorrhage, systemic emboli, and arterial occlusion.

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 LA (7.7%) [6].

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) [7], [8].

In our case, moderate to severe mitral regurgitation was present. Such finding was due to cystic's compression to the valvular apparatus. Such a finding is unique and we did not find in the English literature so far [9].

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 [7].

The diagnosis of heart echinococcosis can be divided into two steps: Revealing of the cyst and its identification as *Echinococcus*. It is based on serological reactions, ultrasound, X-rays, CT-scan, and/or MRI-scan. Although, the serologic reactions provide essential information their sensitivity is not high and parameters frequently do not correspond to the morphological changes [8], [10], [11].

TTE is a relatively simple and very reliable method to diagnose echinococcosis [12], [13]. TEE may give essential supplementary information [14], [15], especially in the case of multiple cysts. Large cysts are well visualized at X-rays examination in frontal and lateral positions. CT and MRI are other useful methods in differential diagnostics of cysts [15], [16]. "Double" wall is a specific symptom that indicates the presence of an *Echinococcus* reference?

As in our case, treatment of choice even for symptomatic 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 [6].

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 [7].

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 post-operative years.

## Conclusion

*Echinococcus* cyst lesion in the LV in lateral wall, not communicating with the LV cavity, has been removed successfully with on-pump technique in a 14-year-old child. Median sternotomy was preferred and cardiopulmonary bypass has been considered the safest method. Supplemental medical therapy with albendazole is recommended to reduce the risk of recurrence.

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