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Surgical treatment of cardiac echinococcosis: a case report

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Echinococcosis refers is a chronic disease caused by tapeworms of the order *Cyclophyllidea*. Echinococcal cysts increase in size slowly and are often asymptomatic, and the symptoms of cardiac echinococcosis are nonspecific, which in turn can make diagnosis difficult. Early diagnosis and surgical treatment of this disease is crucial to prevent severe complications. Considering that the heart is affected extremely rarely, we want to demonstrate the successful surgical treatment.

Keywords: echinococcus, infection, pericarditis, cyst, heart masses.

Relationships and Activities: none.

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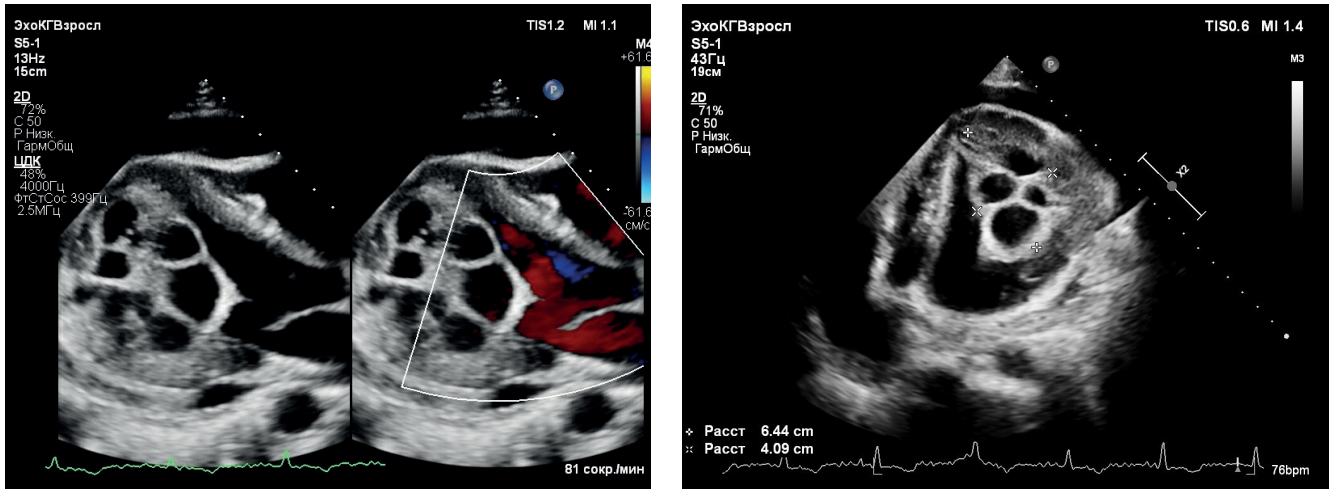
Key messages

- Cardiac echinococcosis is rare (0,5-2%). Cardiac echinococcal cysts are slow growing and nonspecific. The location of cysts determines the symptoms.
- The most serious complications of cardiac echinococcosis are ruptured pericardial cyst with the development of tamponade and anaphylactoid reaction.
- The case clearly reflects the need for an integrated diagnostic approach in verification.

Echinococcosis is an endemic parasitic disease in which the dog, sheep, wolf, jackal, fox, lynx, as a rule, are the definitive hosts [1]. Echinococcosis refers to chronic diseases caused by damage to human organs and tissues by the tapeworm of the order *Cyclophyllidea echinococcus*. Humans become infected from food and water contaminated with animal feces [1]. An echinococcus embryo, passing through the intestinal venous system, can enter the liver, and then the systemic circulation, after which it can enter any organ [1]. Although an echinococcal cyst can affect any organ, the liver is most commonly affected (60%). The second most commonly affected organ is the lungs (20-30%), while heart and brain damage is extremely rare, in 0,5-2% and 2% of cases, respectively [2, 3].

We present a case of surgical treatment of cardiac hydatid cyst.



A **B**

Figure 1. Transthoracic echocardiography. **A** — parasternal view. A multi-chamber formation is visualized in the LV cavity, 6,44×4,1 cm in size, area — 37 cm^2. **B** — four-chamber view, the length and width of the formation are indicated.

Case report

A 22-year-old man was hospitalized in the cardiac surgery department № 3 (September 12, 2022) with complaints of left chest pain, upper abdomen without any connection with physical activity, shortness of breath with minimal physical activity and periodically at rest.

Historical information: he considers himself ill for about 2 weeks, when the above complaints appeared. In this connection, he was examined at the local clinic, where an echinococcal cyst in the left ventricle (LV) was suspected. The patient underwent chest and abdominal computed tomography (CT) — no mass was detected, while pleural, pericardial and abdominal effusion was revealed. With a diagnosis of LV mass, the patient was referred for hospitalization at the Federal Center for Cardiovascular Surgery (Astrakhan). Heredity is not burdened. The patient denies bad habits.

Preliminary diagnosis at admission: LV mass (parasitic LV cyst (echinococcosis)) with a rupture into the pericardial cavity.

NYHA class III heart failure (IIB). ICD-10: I50.0

Physical examination was of moderate severity. The patient was adequate and had normal consciousness. Normosthenic type, satisfactorily nourished. The skin is of normal color, moderate moisture. Peripheral lymph nodes are not enlarged. The chest is symmetrical, painless. Lung percussion and auscultation were without abnormalities. No visual alterations of heart region. On auscultation: muffled heart sounds, normal rhythm, no heart murmurs. The pulse is of satisfactory filling, without deficit. There is no noise of neck arteries. Pulsation in the peripheral arteries of the feet is preserved. The tongue is moist and clean. The abdomen is soft, moderately painful on upper palpation, more on the right. There were no symptoms of peritoneal irritation. The liver percussion protrudes from under the edge of the costal arch +1 cm. The spleen is not palpated. The kidneys are not palpable. Tapping on the lower back painless on both sides. There was no peripheral edema. Blood oxygen saturation was 98%.

At admission, complete blood count noted eosinophilic leukocytosis (leukocyte count — 12,27, eosinophils — 48,4%). Biochemical test revealed alanine aminotransferase of 67,2 (reference values 0-41), creatinine of 128 mmol/l (reference values 60-105 mmol/l), C-reactive protein of 25,77 (reference values 0-6). According to common urine test, proteinuria of 0,18 g/l was detected.

According to transthoracic echocardiography (September 7, 2022) (Figure 1 A, B), there were following LV characteristics: LV end-diastolic volume — 64 ml; LV end-systolic volume — 14 ml; Simpson's LV ejection fraction — 77%; right ventricle (RV): basal section — 3,15 cm; left atrium (LA) — 2,9 cm; LA volume — 40 ml. Cardiac chambers were not dilated. Global myocardial contractility was normal. There was no impairment of local contractility. A multi-chamber mass was located in the LV cavity, occupying most of the LV cavity, attached and tightly connected, probably infiltrating the lateral LV wall, 6,45×4,1 cm in size (area — 37 cm^2). LV diastolic function was normal. The RV systolic function was not impaired. Pulmonary artery systolic pressure — 35 mm Hg. Separation of pericardial layers behind the free RV wall was 1,6 cm, behind the LV posterior wall — 0,7 cm, behind the LV lateral wall — 1,7-1,8

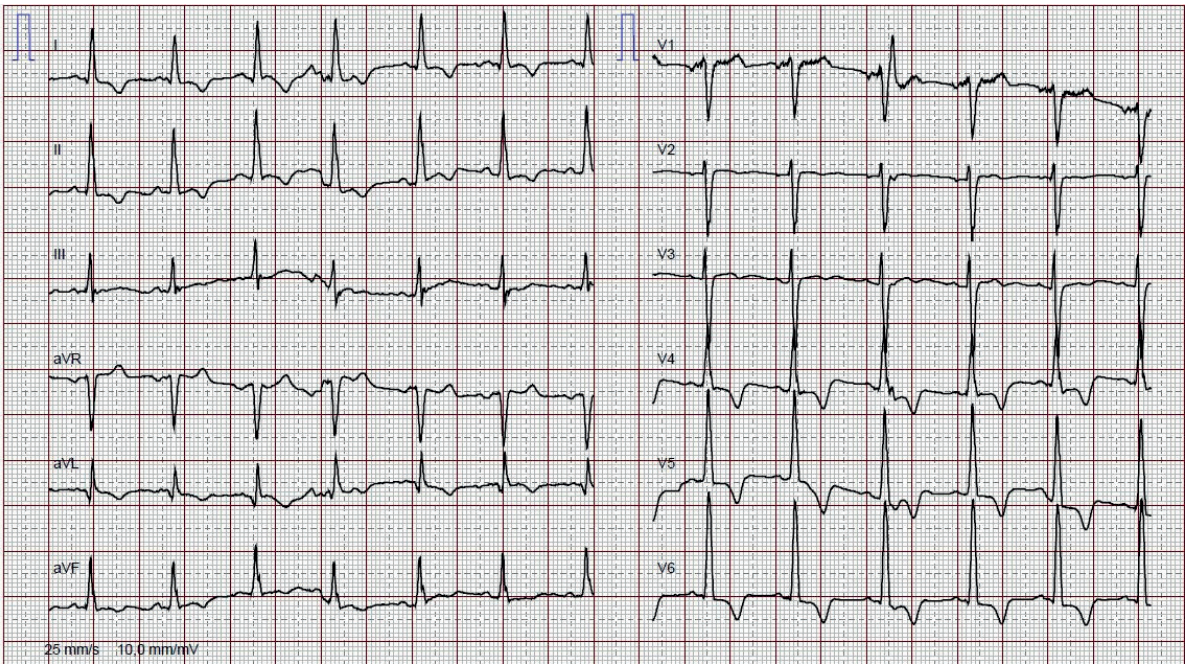


Figure 2. Electrocardiography.

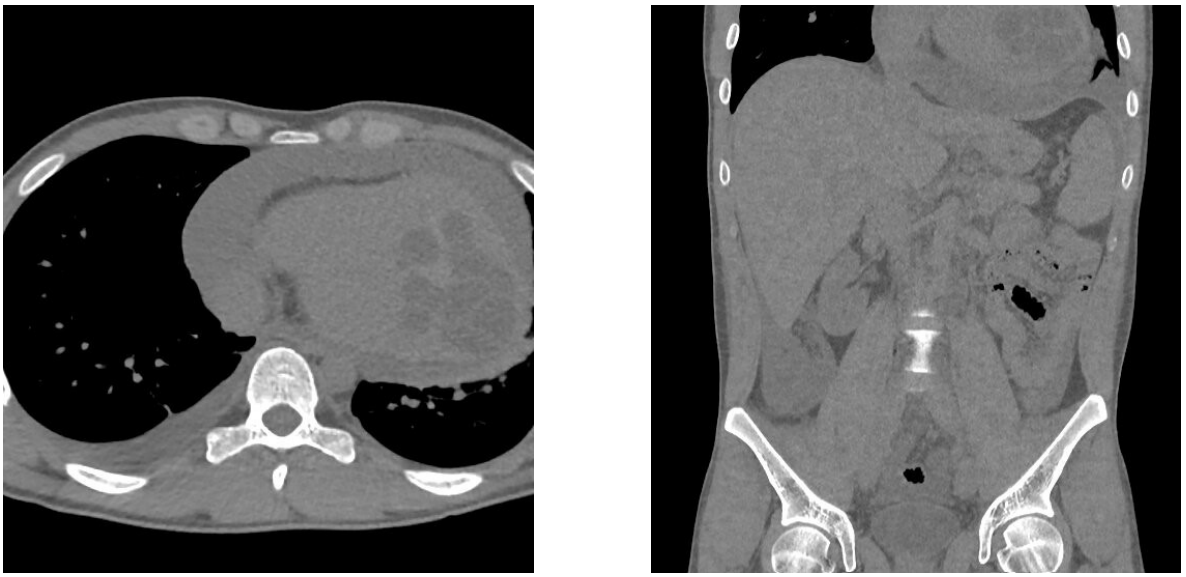


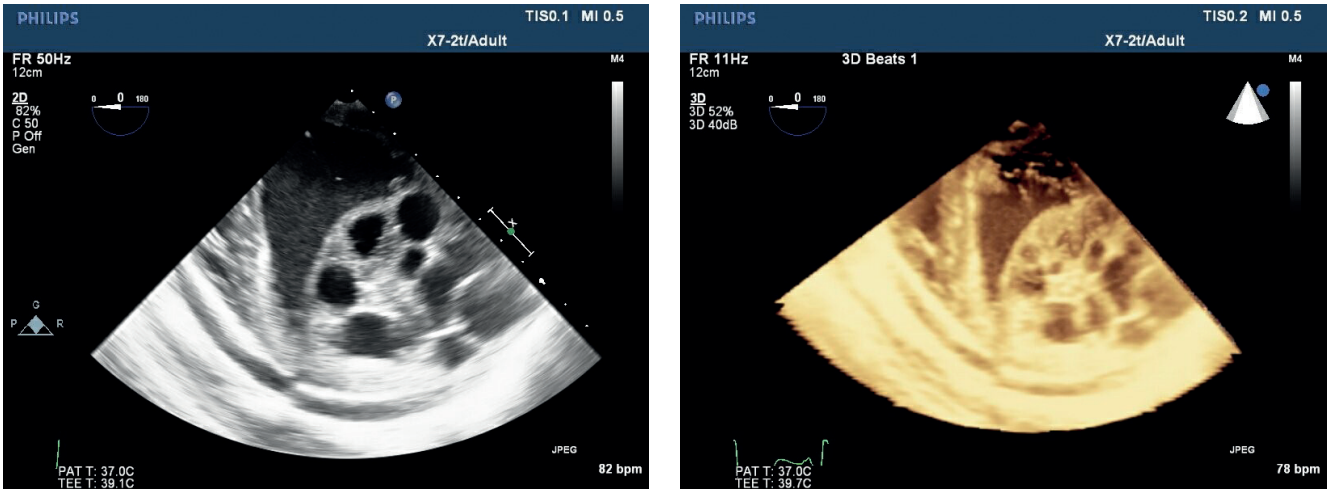
Figure 3. Cardiac CT.

cm, behind the vascular bundle — 0,9 cm, behind the left ventricular apex — 0,6-0,7 cm, behind the right atrium (RA) — 2 cm. The RV wall was with moderate collapse. Fluid was located in the left lateral recess and small pelvis. The pleural fluid was 5,5 cm on the left, 5,6 cm on the right.

According to electrocardiography (September 7, 2022) (Figure 2), sinus rhythm was noted with a heart rate of 80 bpm. The cardiac electrical axis was horizontal. LV systolic overload signs were revealed.

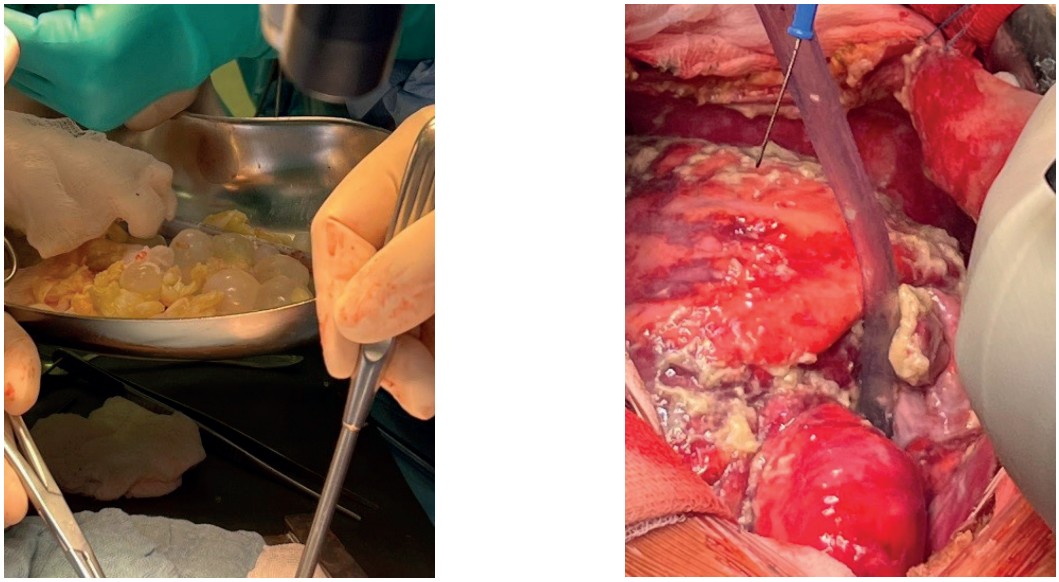
The patient underwent a chest CT (September 7, 2022). Circular fluid accumulation in the pericardial cavity was without collapse signs: 1,8 cm behind the RA, 1,6 cm behind the RV, 1,6 cm to the LV side; the approximate volume was 652 ml. The LV cavity had hypodense multi-chamber cystic formation 7,4×5,6 cm — echinococcus? (Figure 3)

On the back pleural wall there was a small amount of fluid — 1,5 cm thick on the right, 1,2 cm on the left.



A **B**

Figure 4. Intraoperative transesophageal echocardiography. **A** — LV cavity, **B** — 3D echocardiography.



A **B**

Figure 5. Intraoperative view. **A** — echinococcal cysts; **B** — inflammation in the pericardial cavity.

In order to rule out ischemic foci and mass in the brain, the patient underwent a cerebral CT (January 11, 2022) — no mass lesions were detected. Ischemic changes and intracerebral hemorrhages were not detected.

Intraoperative transesophageal echocardiography (Figure 4 A, B) (January 13, 2022) showed that a multi-chamber formation was located in the LV cavity, occupying most of the LV cavity, infiltrating the LV lateral wall with an area of 40 cm^2.

Cardiac access was through a median sternotomy. In the pericardial cavity, there was an inflammatory adhesive process, cloudy yellowish effusion with flakes. The pericardium was thickened up to 4 mm. Cardiolysis. Exploration revealed infiltrate in the area of LV lateral with a wall defect of up to 1,5×1 cm with serous-fibrinous fluid and single balls with transparent contents. A rupture of the echinococcal cyst into the pericardial cavity was revealed (Figure 5 A, B). The pericardial cavity was treated with a hypertonic NaCl solution. The cyst wall of LV lateral wall was additionally dissected. The echinococcal cyst contains many daughter cysts of a grayish color with a transparent content ranging in size from 3 mm to 2 cm. The contents of the cyst and fragments of the chitinous membrane were removed. The residual cavity in LV wall with dimensions of 6×4×3 cm was treated with germicides (hypertonic solution of sodium chloride and 85% solution of glycerol, exposure). It was not connected with the LV cavity and was sutured.

The early postoperative period was uneventful. On the 8th day, the patient was discharged home with a following clinical diagnosis:

Main: LV formation (echinococcal cyst) with a rupture into the pericardial cavity dated September 1, 2022. AHF dated September 1, 2022. ICD-10: D15.1.

Complications: stage IIB NYHA class III chronic heart failure, predominantly right-sided, decompensation.

Operation: removal of a cardiac echinococcal cyst dated September 12, 2022.

The patient was recommended to receive Nemazol 400 mg × 2 times a day for a month, then a break of 2 weeks, then according to the scheme (4 courses in total with breaks of 2 weeks each) + Torasemide 5 mg in the morning (long-term) + Spironolactone 50 mg in the morning (long-term) + Carvedilol 3,13 mg × 2 times a day (constantly) + Omeprazole 20 mg (1 month) + Acetylsalicylic acid 100 mg in the afternoon (constantly).

Discussion

Cardiac echinococcosis was first described by Williams in 1836. In 1846, Griesinger reported 15 autopsy cases. The first successful surgical intervention was performed by Long in 1932. The first successful on-pump operation for cardiac echinococcosis was reported [4, 5]. The most common location of echinococcal cysts is the liver (in 50-70% of cases), lungs (5-30%), muscles (5%), bones (3%), kidneys (2%), spleen (1%) and brain (1%). Cardiac echinococcosis is rare (0,5-2%) [4-6].

Echinococcal cysts increase in size slowly and are often asymptomatic [7, 8], and the symptoms of cardiac echinococcosis are nonspecific, which, in turn, can make diagnosis difficult [9]. Symptoms will vary depending on cyst location. Coronary blood flow is the main route by which parasite larvae reach the heart [10]. Due to the rich coronary blood supply, the LV in 55-60% of cases is the focus of cardiac echinococcosis, while RV — in 10-15% of cases, pericardium — in 7%, pulmonary artery — in 6-7%, LA — in 6-8%, RA — in 3-4%, and interventricular septum — in 4% [2, 6, 10, 11]. Thus, the most frequent localization is the LV free wall, as in our case [7, 12]. In general, surgical excision of cysts is the preferred method of treatment [7, 8]. There are several complications associated with echinococcal cysts, among which the most serious is acute rupture of the cyst into the systemic circulation [7, 8, 12]. In addition, a life-threatening anaphylactoid reaction may occur [8].

Early diagnosis of this condition is critical to prevent these complications. Chest x-ray usually show a normal cardiothoracic ratio or cardiomegaly [13]. Electrocardiographic findings vary depending on cyst location. Echocardiography is simple and useful in the diagnosis of cardiac echinococcosis [13]. CT and magnetic resonance imaging (MRI) provide additional information such as the size and anatomical relationship of the cysts [2, 6, 14]. Serological tests can be false negative in 10-20% of patients with hepatic echinococcal cysts, in 40% with pulmonary cysts, and in 50% with cardiac cysts, this is most likely due to an insufficient immune response [5, 6, 15]. However, enzyme immunoassay is one of the most specific serological tests that can be used, and a positive result for echinococcus antibodies confirms the diagnosis.

The main method of treatment of such patients is a combined approach, which consists in surgical resection of intracardiac echinococcosis with washing of the remaining cavity with hypertonic saline and simultaneous therapy with albendazole. During surgery, care must be taken to avoid rough manipulation of the heart, and to fix the surgical field with gauze soaked in saline to minimize local spread [3, 16-18].

Conclusion

Although cardiac echinococcosis can be fatal, it is rare and often asymptomatic in its early stages. Therefore, clinical suspicion is important for a correct diagnosis. Echocardiography, CT and MRI are useful in the diagnosis and localization of cardiac echinococcosis. Combined surgical resection of intracardiac echinococcosis, lavage of the remaining cavity with hypertonic saline, and simultaneous therapy with albendazole is the main treatment for such patients.

Relationships and Activities: none.

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