

# Cardiac hydatid cysts in a young man: A case report and a literature review

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**Abstract.** Cystic hydatid disease commonly affects the liver and lungs. Cardiac hydatid cysts are a rare occurrence and can cause fatal complications, including anaphylactic shock, systemic or pulmonary embolism, dissemination, arrhythmias, valvular dysfunction or sudden death. The case of a 19-year-old male from a rural area who was admitted to the emergency room with anaphylactic shock is presented in the current study. The patient was subsequently referred to the Department of Pneumology due to a mild fever, a dry cough and thoracic pain. Pneumonia was suspected and antibiotics were administered. As the patient didn't respond to the antibiotics, a pulmonary CT-scan was performed, which demonstrated a bilateral pulmonary embolism of the segmental arteries and the patient was referred to the Department of Cardiology. Transthoracic echocardiography (TTE) demonstrated the presence of a right ventricular mass of ~25x18 mm, attached to its free wall, adjacent to the tricuspid valve causing no tricuspid inflow obstruction. Blood tests were positive for echinococcal infection. Considering that previous reviews had included cases published up until 2018, the present study also included a short literature review of the studies published between 2018 and 2021. The review showed that cardiac hydatid cysts are diagnosed more often in underdeveloped countries, especially in men. Transthoracic echocardiography is the most useful non-invasive imaging technique for diagnosis. Surgery is the treatment of choice, but consideration must be given to the risk-benefit ratio and the shared decision-making approach. The complete surgical removal of the cyst(s) is the major prognostic factor of the cardiac manifestation. This study emphasizes the importance of considering cardiac echinococcosis as a potential diagnosis in patients from endemic or farming areas.

## Introduction

Human hydatid disease is caused by the larval stages of tape-worms of the genus *Echinococcus*. Cystic echinococcosis is a parasitic disease which infects humans when the ova, found in dog feces, are swallowed (1,2). In Europe, hydatid disease is a common health problem, especially in sheep-farming countries. Balkan countries, southern and insular Italy, and central Spain have reported high incidence rates of echinococcosis (1,2). When slowly growing cysts are found in the viscera, echinococcosis must be considered. ELISA is a test with a high sensitivity to detect antibodies against *Echinococcus granulosus* (3). The liver is the most frequent primary site of *Echinococcus granulosus* infection (60-70%), followed by the lungs (10-15%) and spleen (2). Cardiac echinococcosis is a rare occurrence and clinical manifestation depends on the location, size and integrity of the cyst (1,2). Among all infected patients, 0.5-2% exhibit cardiac involvement (4,5). The prevalence of right ventricular hydatid cysts is low (~10%) compared with the prevalence of left ventricular cysts (60%) (5). Cardiac hydatidosis can cause fatal complications, such as anaphylactic shock, systemic embolism when the cyst is located in the left ventricular outflow tract, or pulmonary embolism when it is located in the right ventricular outflow tract (6-8). Macroscopically, it has a uni- or multi-cystic cavity, filled with fluid, containing small daughter cysts and hydatid sand (9). Microscopic examinations are essential in order to establish the diagnosis. Surgery is the treatment of choice (10), but the risk-benefit ratio must be considered. The complete surgical removal of the cyst(s) is the major prognostic factor of the cardiac manifestation (3). Adjunctively, albendazole should be administered several days before surgery and a few weeks after resection (11). The hydatid cyst occurrence rate is 10% after surgery, but if medical treatment is given, this rate can decrease (12). The present study emphasizes the importance of considering cardiac echinococcosis as a potential diagnosis in patients from endemic or farming areas.

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## Case report

The case of a 19-year-old male from a rural area, who was admitted to a local Emergency Department (Hospital of

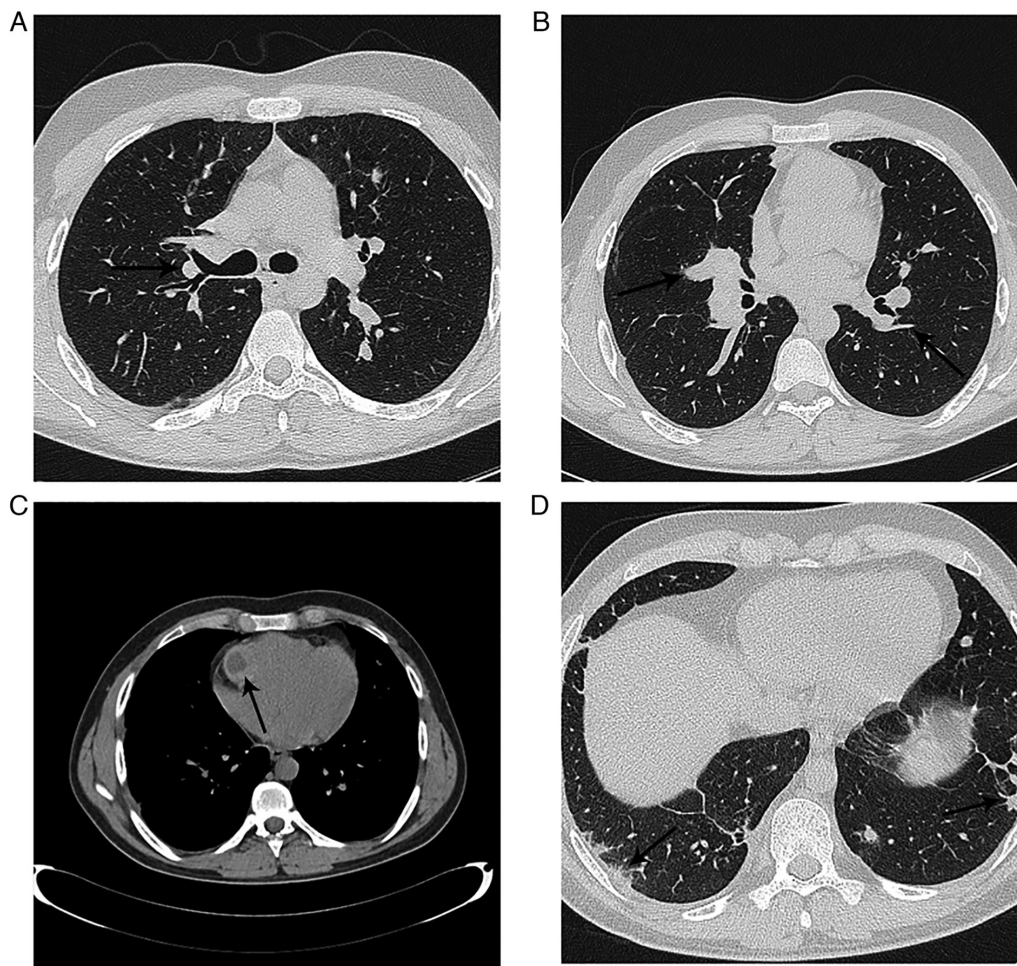


Figure 1. Pulmonary CT scan presenting (A) bilateral central pulmonary nodules, (B) a bilateral pulmonary embolism of the segmental arteries, (C) a mass on the right ventricle free wall and (D) subpleural pulmonary nodules.



Figure 2. Standard electrocardiogram presenting (on the initial presentation) normal sinus rhythm, normal QRS axis (at  $50^\circ$ ), QRSD 120 msec, ventricular rate 80/min, S1Q3T3 pattern (arrows) and nonspecific intraventricular conduction delay in DIII, and aVF, QTc 404 msec. QTc, corrected QT interval; QRSD, QRS duration; aVR, augmented right vector; aVL, augmented left vector; aVF, augmented vector foot.

Buzau, Buzau, Romania) in April 2016 with anaphylactic shock, is presented. Considering the patient's symptoms, including a mild fever ( $37.5^\circ\text{C}$ ), sharp right-sided thoracic pain and a dry cough, he was referred to the Department of Pneumology. Chest radiography indicated left lower

lobe pneumonia and as the patient's CURB-65 (scored based on confusion; BUN,  $>20$  mg/dl; respiratory rate,  $\geq 30$  breaths/min; blood pressure: Systolic,  $<90$  mmHg; diastolic,  $\leq 60$  mmHg; and age,  $\geq 65$  years) score was 0, the patient received amoxicillin and clavulanic acid

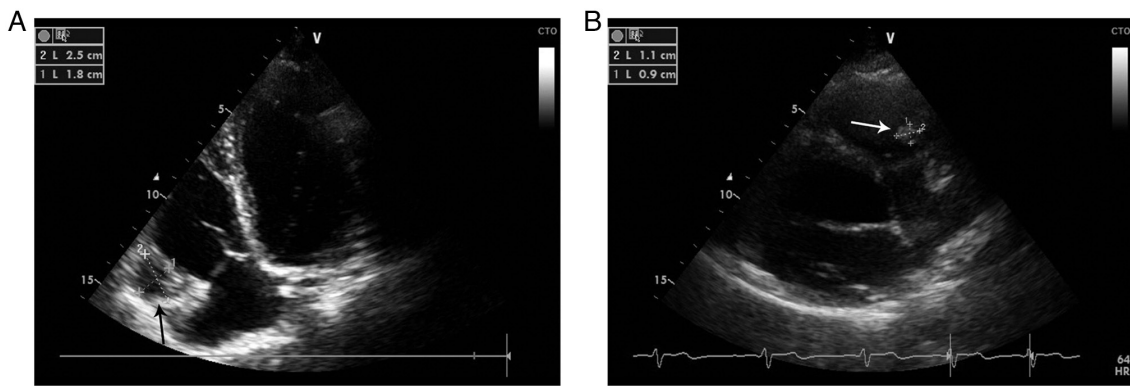


Figure 3. Transthoracic echocardiography presenting (A) initial presentation a slightly enlarged RV, moderate RV systolic dysfunction and a bi-lobular mass attached to the free right ventricular wall adjacent to the tricuspid valve causing no obstruction (arrow), and a (B) marked reduction in dimensions of the RV cardiac cyst and an increase of its echogenicity (1-year follow-up). RV, right ventricle.

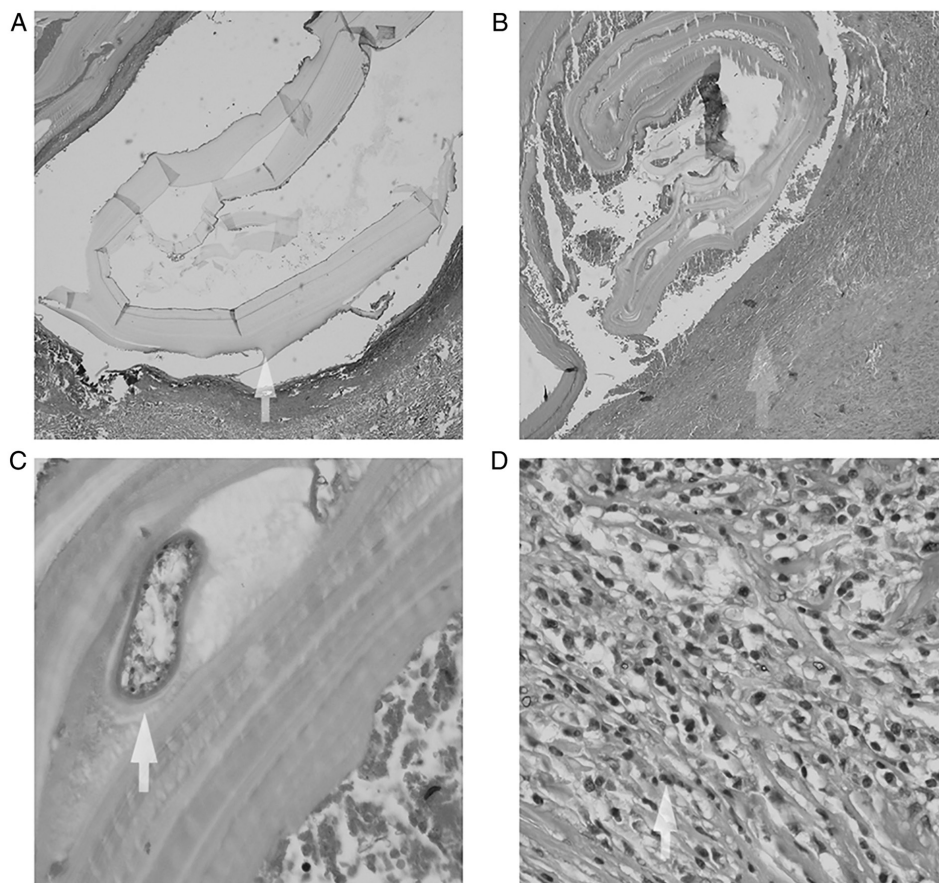


Figure 4. Histological analysis of excised hydatid cysts. (A) Anhydrous, lamellar, hyaline hydatid cyst membrane (magnification, x10). (B) Two hydatid cysts (magnification, x10). (C) Protoscolex (magnification, x40). (D) Granulation tissue rich in eosinophils (magnification, x40). All described features are highlighted using arrows.

(875/125 mg) twice-daily for 7 days and was discharged. Over the next 10 days the patient's symptoms worsened and he was admitted again to the same hospital and a pulmonary CT scan was performed. The pulmonary CT-scan demonstrated a bilateral pulmonary embolism of the segmental arteries (Fig. 1A and B), as well as a cystic mass on the right ventricular free wall (Fig. 1C). The patient was therefore referred to the Department of Cardiology of the 'Coltea' Clinical Hospital (Bucharest, Romania).

Following admission to the Department of Cardiology, the patient had no fever, was hemodynamically stable, had a normal respiratory rate, had 94% oxygen saturation while breathing ambient air and exhibited barely audible respiratory sounds in his left lung basal segment, as well as fine rales. Routine laboratory tests demonstrated eosinophilia (12.2%; normal cut off, 5%), elevated D-dimer (464 ng/ml; normal cut off, 250 ng/ml) and elevated C-reactive protein (3.9 mg/dl; normal cut off, 0.3 mg/dl) levels. A standard electrocardiogram demonstrated an

Table I. PubMed literature review of cases reported between 2018 and 2021.

First author/s, year	Age, years	Sex	Country	Symptom/s	Diagnostic method/s	Localization	Size of cyst/s (mm)	Medication/s	Surgery	Follow-up	(Refs.)
Firouzi <i>et al.</i> , 2019	57	Male	Iran	Atypical chest pain	TTE	Left ventricle/ right AV groove	107x75 27x25	Albendazole	Yes	-	(44)
Yimamu <i>et al.</i> , 2021	39	Male	China	Asymptomatic	CT/TTE	Pericardium	72x86 85x75	Albendazole	Yes	12 months no recurrence	(49)
Singh <i>et al.</i> , 2019	57	Male	India	Syncope	TEE/CMR	Right ventricle	10x10	Albendazole/ mebendazole	No	12 months no recurrence	(50)
Separovic Hanzevacki <i>et al.</i> , 2018	21	Male	Croatia	Palpitations/ fatigue	TTE/CMR	Interventricular septum	68x28x51 (by CMR)	Albendazole/ praziquantel	Yes	6 months no recurrence	(51)
Emam Hadi <i>et al.</i> , 2018	30	Female	Iran	Shortness of breath, heaviness on the chest, sudden death	Autopsy	Inferior vena cava/right atrium/right ventricle	Multiple cysts, 30 (average)	-	-	-	(52)
Mesrati <i>et al.</i> , 2020	26	Male	Tunisia	Mild chest pain, syncope, sudden death	Autopsy	Right ventricle	50x49	-	-	-	(53)
Kumar <i>et al.</i> , 2020	32	Female	India	Atypical chest pain	TTE/CMR	Right ventricle	60x40 (by TTE) 35x59x45 (by CMR)	Albendazole	Yes	No data	(14)
Jamli <i>et al.</i> , 2020	27 patients (mean age, 35 years)	Male/ female, 1.7	Tunisia	Atypical chest pain (n=17), dyspnea (n=10), palpitations (n=16), other	TTE/TEE/ CMR	Right ventricle (n=7) left ventricle (n=5) septal (n=5) other	No data	Albendazole	Yes (all)	19 patients follow-up (8.4±3.9 years) No recurrence	(64)
Wadhawa <i>et al.</i> , 2018	10 patients (mean age, 35.9+12.04 years)	Male/ female, 1.4	India	Dyspnea (n=7), chest pain (n=7), fatigue (n=6), other	TTE/CT/ CMR	Left ventricle (n=7)/ interventricular septum (n=2)/ pericardial (n=2)	40x20 (minimum) 120x110 (maximum)	Albendazole	Yes (all)	10 patients follow-up (2 months- 5 years) No recurrence	(54)
Giri <i>et al.</i> , 2020	79	Female	Bhutan	Dyspnea	TTE/CT	Interventricular septum	67x76x82	Albendazole	Yes	No data	(15)

Table I. Continued.

First author/s, year	Age, years	Sex	Country	Symptom/s	Diagnostic method/s	Localization	Size of cyst/s (mm)	Medication/s	Surgery	Follow-up	(Refs.)
Lu <i>et al</i> , 2019	44	Female	China	Palpitations	CMR	Interventricular septum and posterior apex of the left ventricle	61x46	No data	Yes	16 months No recurrence	(65)
Kuemmerl <i>et al</i> , 2021	29	Male	Southern Europe	Syncope	CMR	Pericardium	130	Albendazole	Yes	3 months No recurrence	(16)
Çankaya <i>et al</i> , 2021	20	Female	Turkey	Dyspnea, chest pain	TTE/CMR	Right ventricle	43x35x28	Albendazole	Yes	No data	(17)
Iriz <i>et al</i> , 2020	15	Female	Turkey	Atypical chest pain	TTE/ CT/CMR	Interventricular septum	57x44x42	Albendazole	Yes	No data	(18)
de Gregorio <i>et al</i> , 2021	50	Male	Italy	Dyspnea, atypical chest pain	TTE/CT/ CMR	Interventricular septum/ pericardium/ right ventricle outflow tract	No data	Albendazole	Yes	No data	(8)
Singh <i>et al</i> , 2019	28	Male	India	Dyspnea	TTE/CT	Left ventricle/ pericardium	No data	Albendazole	No	No data	(50)
Singh <i>et al</i> , 2021	25	Male	India	Dyspnea, chest pain	TTE/TEE	Interventricular septum	69x56	Albendazole/ praziquatel	Yes	Died on postoperative day zero	(20)
Shakerian <i>et al</i> , 2021	34	Male	Iran	Dyspnea	TTE/CT	Right ventricle outflow tract	40x40	Albendazole	Yes	No data	(21)
Alami <i>et al</i> , 2019	43	Male	Morocco	Dyspnea, chest pain	CT/MRI	Interventricular septum	No data	Albendazole	Yes	12 weeks No recurrence	(22)
Cheng <i>et al</i> , 2021	48	Male	China	Chest pain	TTE/CMR	Right ventricle	29x26	Albendazole	No	No data	(23)
De <i>et al</i> , 2020	50	Female	Vietnam	Dyspnea, chest pain	Chest MRI	Left ventricle	30x33	Albendazole	Yes	2 months No recurrence	(24)
Rhissassi <i>et al</i> , 2021	23	Male	Morocco	Asymptomatic	TTE/CMR	Right ventricle	53x56	Albendazole	Yes	No data	(25)
Jain <i>et al</i> , 2021	46	Male	Turkmenistan	Dyspnea	TTE/ MRI/CT	Pericardium	No data	Albendazole	Yes	1 month No recurrence	(26)

Table I. Continued.

First author/s, year	Age, years	Sex	Country	Symptom/s	Diagnostic method/s	Localization	Size of cyst/s (mm)	Medication/s	Surgery	Follow-up	(Refs.)
Madisson- Bernardo <i>et al.</i> , 2019	49	Male	Brazil	Dyspnea, atypical chest pain	Chest MRI/ TTE	Pericardium	No data	Albendazole	No	1 year No recurrence	(27)
Kaskar <i>et al.</i> , 2020	14	Female	India	Dyspnea	CT/TTE/ TEE	RV	29x12	Albendazole	Yes	3 months No recurrence	(28)
Handran <i>et al.</i> , 2020	47	Male	Sudan	Syncope	CT/MRI	Interventricular septum	50x50	No data	Yes	No data	(29)
Kohlmaier <i>et al.</i> , 2018	16	Female	Austria	Dyspnea	TTE/CT/ MRI	RV	40x40	Albendazole/ praziquantel	Yes	7 months Pulmonary arterial hypertension (systolic arterial pressure, 50 mmHg)	(30)
Vural <i>et al.</i> , 2019	22	Male	Turkey	Angina	TTE/ Cineangio- graphy CT/TTE	Left ventricle/ intracoronary	20x20	Albendazole	Yes	1 year No recurrence	(31)
Derbel <i>et al.</i> , 2019	37	Male	Tunisia	Acute blurred vision		Interventricular septum	30x30	Albendazole	Yes	No data	(32)
Orhana <i>et al.</i> , 2018	26	Male	Turkey	Dyspnea, hemoptysis	TTE	RV	No data	Albendazole	Yes	No recurrence	(6)
Stiru <i>et al.</i> , 2019	24	Male	Romania	Facial paralysis, headaches	TTE/CT	Interventricular septum	23x19	Albendazole	Yes	1 year No recurrence	(33)
Sarr <i>et al.</i> , 2019	65	Male	Senegal	Limb edema	TTE/CT	Pericardium	86x61	Albendazole	No	2 months Fatal outcome	(55)
Sonsoz and Gunes, 2020	32	Male	Turkey	Constitutional symptoms	TTE/CMR	RV	25x21	Albendazole	Yes	Died on postoperative day 2	(34)
Al-Hakkak <i>et al.</i> , 2019	18	Male	Iraq	Acute right lower limb pain	TTE/CT	Left ventricle	36x40	Albendazole	Yes	No data	(35)

Table I. Continued.

First author/s, year	Age, years	Sex	Country	Symptom/s	Diagnostic method/s	Localization	Size of cyst/s (mm)	Medication/s	Surgery	Follow-up	(Refs.)
Rossetti <i>et al</i> , 2018	15	Male	Argentina	Acute right lower limb pain	TTE	Left ventricle	30x30	Albendazole/ praziquantel	Yes	2 years No recurrence	(7)
Wedin <i>et al</i> , 2021	38	Male	Sweden	Chest pain	TTE/TEE/ CMR/CT	Interventricular septum	35x65	Albendazole	Yes	1 year No recurrence	(36)
Guha <i>et al</i> , 2021	18	Male	India	Chest pain, fever	TTE/TEE/ CT	Interatrial septum	73x32	Albendazole	Yes	1 year No recurrence	(37)
Verma <i>et al</i> , 2020	17	Male	India	Cough, fever	CT	RV	No data	Albendazole	Yes	No recurrence No data	(38)
Fennira <i>et al</i> , 2019	26	Male	Tunisia	Chest pain, asthenia	TTE	Interventricular septum	48x49	Albendazole	Yes	8 months No recurrence	(13,39)
Zhang <i>et al</i> , 2020	31	Female	China	Cough, fever, hemoptysis, palpitations	TTE/MRI	Right atrium/ pericardium	25x50	Albendazole	Yes	1 year No recurrence	(40)
Zghal <i>et al</i> , 2020	68	Male	Tunisia	Stroke, sudden deaths	TTE	Left ventricle	25x25	-	No	Died	(41)
İyigün <i>et al</i> , 2020	18	Male	Turkey	Asymptomatic	TTE/TEE/ CMR	Interventricular septum	47x47x74	Albendazole	Yes	No date	(42)
Modani <i>et al</i> , 2018	57	Male	India	Chest pain	TTE/CMR	Interventricular septum	40x45	Albendazole	Yes	30 days No recurrence	(43)
Berarducci <i>et al</i> , 2021	48	Male	Mexico	Palpitations, drowsiness	TTE/CMR/ 3D CT	RV	No data	No data	Yes	No recurrence	(45)
Meimand <i>et al</i> , 2020	31	Male	Iran	Dyspnea, hemoptysis	TTE/TEE/ CT	RV	48x20	Albendazole	Yes	Died on postoperative day 3	(46)
Meimand <i>et al</i> , 2020	31	Male	Iran	Right hemiparesis	CT/MRI/ TTE/TEE	Interventricular septum	85x60	Albendazole	Yes	2 months No recurrence	(46)
Vazhev <i>et al</i> , 2018	18	Female	Bulgaria	No data	TTE/CT	Left ventricle	63x53	Albendazole	Yes	1 year No recurrence	(47)
Lyazidi <i>et al</i> , 2021	14	Female	Morocco	Dyspnea, palpitations	TTE	RV	47x33	Albendazole	Yes	6 months No recurrence	(48)
Harmouchi <i>et al</i> , 2022	15	N/A	Morocco	Cough, arthralgia	TTE/CMR	Right atrium	23x32	Albendazole	Yes	No recurrence No data	(66)

RV, right ventricle; TTE, transthoracic echocardiography; TEE, transesophageal echocardiography; CMR, cardiac magnetic resonance; AV, atrioventricular; PAH, pulmonary hypertension; sPAP, systolic pulmonary pressure; N/A, not available.

SIQ3T3 pattern and nonspecific intraventricular conduction delay in the inferior leads (Fig. 2). Furthermore, transthoracic echocardiography (TTE) revealed a slightly enlarged right ventricle (RV), with moderate RV systolic dysfunction, as well as a bi-lobular mass attached to the right ventricular free wall adjacent to the right ventricular inflow, without causing any inflow obstruction (Fig. 3A). Transesophageal echocardiography did not provide any additional information. Furthermore, at that time, the patient had no other organ involvement. During hospitalization, the patient received low molecular weight heparin (enoxaparin, 60 mg/0.6 ml twice-daily by subcutaneous injection) and a parasitology exam was requested. The ELISA assay (SERION ELISA Classic; SERION Diagnostics) was positive for *E. granulosus* IgG antibodies (10.18 U/ml; normal cut off, 1.1 U/ml) and therefore antiparasitic treatment using albendazole (400 mg, twice daily) was administered. During hospitalization, the clinical evolution improved and the patient became stable and asymptomatic. The patient was discharged with conservative treatment (albendazole, 400 mg twice-daily; levocetirizine, 5 mg twice-daily) and a recommendation for cardiac surgery evaluation, which the patient refused. In the first year of clinical evolution, the patient was assessed in the Department of Cardiology twice and was stable and asymptomatic. Serial transthoracic echocardiograms demonstrated a marked reduction in the dimensions of the RV cardiac cyst and an increase in its echogenicity (Fig. 3B).

After the first year, the patient was lost to follow-up for 2 years, and during the subsequent year, the patient presented at the Department of Pneumology with hemoptysis after abandoning the antiparasitic treatment. A pulmonary CT-scan showed bilateral central pulmonary nodules and subpleural pulmonary nodules (Fig. 1D) and the patient was referred for thoracic surgery where four hydatid cysts were excised. Histological analysis confirmed the presence of pulmonary hydatid cysts (Fig. 4) and it was recommended that the patient resume antiparasitic treatment.

## Literature review

A short PubMed (<https://pubmed.ncbi.nlm.nih.gov/>) literature review on cardiac echinococcosis was performed. Search criteria included the following keywords: 'cardiac hydatid cyst echinococcosis'. Considering that other reviews included cases that were published up until 2018 (11,13), it was determined that cases reported between 2018-2021 would be analyzed in the present study. The collected data are presented in Table I.

Cardiac hydatid cysts are more often diagnosed in men living in underdeveloped countries (1,11). Among 47 reported cases identified in the present literature review, >70% of patients were male (4-6,12-53). The median age of patients with cardiac echinococcosis was 36 years. Cardiac echinococcosis symptoms varied greatly, with chest pain and dyspnea being the most common (34%). The most common cardiac tissue involved was the RV (32%), followed by the interventricular septum (27%) and pericardium (13%) (12-50). Moreover, cardiac hydatid cysts were reported to vary in size. The largest cysts identified in the present review were >100 mm long (16,44,54), whereas the median cyst length was 47.5 mm. The most useful imaging technique was TTE. Furthermore, the review data indicated that >80% of patients underwent cardiac surgery. Most of

the patients were followed-up for 12 months (surgical and non-surgical patients). A total of four patients died shortly after diagnosis; three deaths were caused by postoperative complications and one was caused by stroke (20,34,41,53).

From the present literature review it was concluded that cardiac echinococcosis is more common in men <40 years old and patients may present with various symptoms. Their size can vary greatly, reaching >100 mm in length (16,44,54). TTE is the most useful imaging technique due to its availability, reproducibility, accuracy and safety. To improve the characterization of the tumor, cardiac MRI can be performed. Surgery is the treatment of choice, but the risk-benefit ratio and shared decision making with the patient must be considered. The available data from non-surgical patients shows that three of them died shortly after diagnosis (<2 months) (19,41,55) and two of them had a good outcome (23,27). In the present case, the patient refused cardiac surgery and chose medical treatment. Albendazole is an active agent against *Echinococcus* and should be administered adjunctively, pre- and post-surgery (11). No disease recurrence was observed in patients who underwent surgery and pharmaceutical treatment with albendazole.

## Discussion

Human hydatid cysts are caused by the larval stages of tapeworms of the genus *Echinococcus* (56). In most cases, multiple organs are affected. Cardiac echinococcosis appears in 0.5-2% of patients, usually with multiple organ involvement, following the invasion of the myocardium via the coronary artery (57). Most commonly cardiac hydatid cysts involve the left ventricular cavity (60%), followed by the right ventricular cavity (10-15%), pericardium (7%), the atria and the interventricular septum (2). Moreover, clinical manifestations of benign cardiac tumors depend on the size and location of the mass and the infiltration of adjacent tissues (58). Most patients with cardiac hydatid cysts are asymptomatic. Signs and symptoms of cardiac echinococcosis are nonspecific and are directly related to the location and the size of the cysts. They may develop because of compression or rupture of the hydatid cyst, which is the most important and potentially fatal complication. Generally, nonspecific chest pain is the most common symptom, whereas dyspnea following exertion is often related to multiple hydatid cysts in the lungs (59). The major complications of cardiac hydatid cysts include anaphylactic shock, cardiac tamponade, systemic or pulmonary embolism, arrhythmias, valvular dysfunction and sudden death (11). Anaphylactic shock was the first symptom in the present case, which was treated with adrenaline, according to the available protocols (60). Shortly after anaphylactic shock, the patient developed a pulmonary embolism requiring low-molecular weight heparin (enoxaparin, 60 mg/0.6 ml twice daily).

The diagnosis of hydatid cysts is based on imaging results and specific serological tests (3). The method of choice to detect cardiac hydatid cysts and determine their number, size, location and relation to other anatomical structures is 2D TTE. Cardiac MRI may be useful for improved characterization of cardiac tumors, but it requires appropriate experience to be used effectively. ELISA is the most specific serologic test that can be used and a positive result for *Echinococcus* antibodies confirms the diagnosis (61). Surgery is the treatment of



choice (10,11), but the risk-benefit ratio must be considered and shared decision making with the patient must be taken into account. Shared decision-making is not commonly used in Romania and it depends on numerous factors, including the level of education of the patient (62). In the present case report, the patient refused cardiac surgery. If complete removal of the cysts is possible the prognosis is good, with a low rate of recurrence (11). Medical treatment with albendazole has a role in reducing the size of cysts and stopping their development and represents the only therapeutic option in inoperable cases (63).

In the present study the echocardiographic assessments at serial evaluation (four times in 3 years) documented marked reductions in the dimensions and increases in echogenicity of the right ventricular hydatid cyst under antiparasitic treatment. These results suggested a low risk of rupture; however, symptoms of pulmonary embolism occurred in the evolution of the present case. Therefore, in the absence of cardiac surgery, the prognosis and further evolution are unpredictable and long-term antiparasitic treatment and frequent clinical, imagistic and biological evaluation are required.

Cardiac echinococcosis infection can clinically have a wide range of symptoms, from none at all to sudden death. Diagnosis must be suspected in patients who come from regions where tapeworms of the genus *Echinococcus* are endemic. The patient in the present study lived in a rural area of an endemic country and the symptomatology at the first hospital admission was anaphylactic shock. Moreover, blood tests showed eosinophilia, which led to the consideration of a parasitic infection in the differential diagnosis. The clinical history of the patient is important and echocardiography is a reliable, safe and effective imaging method for the initial diagnosis.

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### Availability of data and materials

All data generated or analyzed during this study are included in this published article.

### Authors' contributions

MB wrote the initial draft, collected data by performing the experiments, performed the review, constantly revised the article according to reviewers and participated in the final design of the article. DM was involved in the acquisition of data and described the patient evolution and management. AT performed and described the microscopic examination. MO performed the thoracic surgery, revised the initial draft and analyzed data from the literature. AG was involved in the analysis and interpretation of data, performed the literature review and revised the final manuscript. MB and AG confirm the authenticity of all the raw data. All authors read and agreed to the final manuscript.

### Ethics approval and consent to participate

Ethics approval was obtained from the Medical Ethics Commission for Clinical Studies in the 'Coltea' Clinical Hospital (Bucharest, Romania; approval number 24216/86; 2021/12/09).

### Patient consent for publication

Written informed consent for publication was obtained from the patient prior to publication at the time of admission.

### Competing interests

The authors declare that they have no competing interests.

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