

Case Report of Isolated Cardiac Hydatid Cyst in the Interventricular Septum without Other Organs Involvement

Tiange Li¹, Yunfei Ling¹, and Yongjun Qian¹

¹Sichuan University West China Hospital

September 12, 2022

Abstract

Human hydatid disease occurs after infection with *Echinococcus granulosus*, mainly involved liver and lung. Here we reported a 48-year-old woman, who presented to our hospital with intermittent chest pain. Transthoracic echocardiography, Enhanced CT and MRI of heart were performed, revealed the cyst located at the interventricular septum near the right ventricular apex. Other organs including lung and liver were not involved. The cyst was successfully removed, while postoperatively pathological biopsy confirmed the infection of *Echinococcus granulosus*, thus, she was finally diagnosed as isolated cardiac hydatid cyst.

1. Introduction

Human hydatid disease (HD) is a parasitic infection disease, occurs mainly as a result of infection with the larvae of *Echinococcus granulosus*. Dogs are main primary hosts and sheep are intermediate hosts, thus, HD can be more common seen in persons living in areas where animal husbandry is practiced. The most commonly involved site of hydatid cysts (HC) is the liver, while cardiac echinococcosis is an uncommon disease¹. A considerable proportion of the HD patients can stay asymptomatic, until the space-occupying effect in the involved organ brings out symptoms². However, not similar with other organ involved, patients with cardiac HC usually appear symptomatic, though the exact proportion remains unknown^{3,4}. Chest pain, dyspnea, syncope and palpitations are common symptoms in patients with cardiac HC, while patients can also show infection-associated symptoms such as cough and fever^{1,5}. Among all cases of cardiac HC, the interventricular septum (IVS) is the site rarely involved^{1,2,5}. Here, we reported a case of old woman who suffered a cardiac HC located in the IVS.

2. Case presentation

A 48-year-old female from Tibet, China was admitted to our hospital presented with a 4-month history of intermittent pain of chest and back. Each time the pain attacked would last about 1 hour and usually twice a day, it often followed with mild fever and headache. For personal history, the patient raised sheep and cattle for a living. With the exception of a slightly slow heart rate of 47 bpm, her vital signs revealed normal. Cardiac murmur was not found within each cardiac cycle, the electrocardiogram also revealed no significant abnormality. For routine laboratory tests, all results remained in the normal limits, except an elevated percentage of eosinophils.

Among further cardiac examination, the main anomaly found by transthoracic echocardiography (TTE) was a slightly weak-echo mass located at the myocardium of the right ventricular apex (Figure 1, *panel A*). Besides the mass, TTE also revealed a patent foramen ovale, mild tricuspid regurgitation and a small pericardial effusion. Computed tomography angiography (CTA) of the chest was performed, which revealed a soft tissue nodule without enhancement within the IVS near the right ventricular apex, the boundaries between the mass and surrounding myocardium were indistinct (Figure 1, *panel B*). To clarify the diagnosis, enhanced MRI of the heart was carried out and revealed a cystic, heterogeneous-intensity IVS mass (3.0cm ×

2.8cm) which was isointensity in T1-weighted images, slight hyperintensity in T2-weighted images, and no significant enhancement in contrast-enhanced images (Figure 1, *panel C*). Imaging characteristics of CTA and MRI suggested parasitic infection, thus, further antibody assay of parasite was performed with a positive result of *Echinococcus granulosus* antibody.

After detailed communication, the patient consented to surgical treatment and signed the operation agreement. The patient underwent routine median sternotomy, while cardiopulmonary bypass was established between the superior vena cava, the inferior vena cava and the aorta. After puncturing and drawing the cyst content, 3% hypertonic saline was injected into the cyst, and then, the excision of the cyst was done. The 3% hypertonic saline was also poured into the pericardial cavity to prevent local dissemination. Postoperative histopathological examination confirmed the diagnosis of cardiac HC (Figure 1, *panel D*). The patient was discharged from the hospital without complications on the 5th postoperative day and albendazole would be used for at least 6 months to prevent recurrence.

3. Discussion

Echinococcus granulosus is a helminth parasite, dogs and other carnivorous animals are primary hosts and sheep are intermediate hosts, humans are usually infected as intermediate accidental hosts. which causes echinococcosis or HD. Humans usually become infected by ingesting food, milk, or water contaminated by dog feces containing the ova of the parasite¹. The most common sites of hydatid cysts (HC) are the liver, and then are lungs², only 0.5%–2% HD patients show a cardiac involvement³⁻⁷, possibly due to persistent movement and contraction of myocardium⁸. The distribution in different part of the heart depends on the coronary blood supply, the left ventricular wall is the most common cardiac location, followed by the right ventricle, pericardium, left atrium, and right atrium^{1,9,10}. The interventricular septum (IVS) is less frequently involved, just reported in 4% of all cardiac cases². However, in the majority cases of cardiac HC, the disease usually affects other organs simultaneously¹¹, in other words, cardiac HC is more likely to happen secondary to hepatic HC, case like we reported here, HC located at the IVS without imaging findings of liver or lung involvement is extremely rare.

Most of HD patients can remain asymptomatic for many years, whereas, the condition seems different in patients with cardiac HC. S. Fennira and colleagues reviewed cases of HC in the IVS from 1964 to 2019, finally included 45 cases, showed only 5 patients (11%) were asymptomatic¹. Yaman ND also reviewed studies of cardiac *echinococcosis* worldwide, which included 86 patients, only 5 patients (6%) were asymptomatic. These findings suggest cardiac HC is a more serious condition and easier to present clinical symptoms. The type and severity of clinical manifestations mainly depend on the organ involved, the number and size of the cyst and other complications¹², thus, symptoms are various. Compression to coronary arteries by a cyst can cause myocardial ischemia, easily give rise to precordial pain, and more severe, it may cause myocardial infarction, which increase the incidence of sudden death. If the cyst gives the compression to the cardiac conduction system, conduction block will happen, if gives the compression to pulmonary artery, dyspnea and cyanosis may occur. When the cyst has a tendency of intracardiac development, direct mechanical interference to valves and changes to the size of chambers will influence the cardiac function, results in symptoms of heart failure, such as dyspnea, weakness, dizzy and edema. Complications including bacterial infection, cyst rupture and most serious, anaphylactic shock. However, exact prevalence remains unclear. This patient presented with intermittent chest pain, which suggested acute myocardial ischemia.

Some serological tests such as eosinophil count, indirect hemagglutin, enzyme-linked immune sorbent assay and Casoni intradermal test have clinical diagnosis value for *Echinococcus granulosus* infection, but due to the false negativity and limited sensitivity and specificity, are usually not enough to diagnose. The diagnosis is primarily confirmed by combination of clinical findings, imaging and serology. Eugenio Zalaquett and colleagues concluded features of HD on ultrasound, CT and MR imagings, and classified HC into five types to help clinical diagnosis¹². Final diagnosis should be confirmed by histopathological examination, different developmental stage of *Echinococcus granulosus* could be found. Aviral Gupta reported a case of cardiac HC, showed a pathological image of acellular lamellated membranes of HC with partially autolyzed brood capsules, which confirmed the diagnosis¹³. Similar HC in the background of myocardium could also be found

on our pathological image.

4. Conclusion

We described a rare case of cardiac HC located at the IVS without liver or lung involvement simultaneously, the patient presented classical symptoms of chest pain and was successfully underwent surgical excision. Postoperative pathological image confirmed the diagnosis of cardiac HC.

Abbreviations

HD: hydatid disease; HC: hydatid cyst; IVS: interventricular septum; TTE: transthoracic echocardiography; CTA: computed tomography angiography.

References

- 1 Fennira, S. *et al.* Cardiac hydatid cyst in the interventricular septum: A literature review. *International journal of infectious diseases : IJID : official publication of the International Society for Infectious Diseases* **88** , 120-126, doi:10.1016/j.ijid.2019.09.004 (2019).
- 2 Yaman ND, S. M. Cardiac hydatid cysts- review of recent literature. *J Vet Med Res* **4(8)** , 1102. (2017).
- 3 Fiengo, L. *et al.* Giant cardiac hydatid cyst in children: case report and review of the literature. *Clinical medicine insights. Case reports* **7** , 111-116, doi:10.4137/CCRep.S15862 (2014).
- 4 Díaz-Menéndez, M. *et al.* Management and outcome of cardiac and endovascular cystic echinococcosis. *PLoS neglected tropical diseases* **6** , e1437, doi:10.1371/journal.pntd.0001437 (2012).
- 5 Kahlfuß, S., Flieger, R. R., Roepke, T. K. & Yilmaz, K. Diagnosis and treatment of cardiac echinococcosis. *Heart (British Cardiac Society)* **102** , 1348-1353, doi:10.1136/heartjnl-2016-309350 (2016).
- 6 Akpınar, I. *et al.* Extremely rare cardiac involvement: recurrent pericardial hydatid cyst. *Internal medicine (Tokyo, Japan)* **51** , 391-393, doi:10.2169/internalmedicine.51.6370 (2012).
- 7 Atilgan, D. *et al.* Role of transesophageal echocardiography in diagnosis and management of cardiac hydatid cyst: report of three cases and review of the literature. *Journal of the American Society of Echocardiography : official publication of the American Society of Echocardiography* **15** , 271-274, doi:10.1067/mje.2002.120507 (2002).
- 8 Aljaber, N. N., Alshoabi, S. A., Qurashi, A. A. & Daqqaq, T. S. Cardiac hydatid cyst in the right ventricle: An unusual case at a rare site. *Journal of Taibah University Medical Sciences* **15** , 249-252, doi:10.1016/j.jtumed.2020.02.004 (2020).
- 9 Niarchos, C. *et al.* Large hydatid cyst of the left ventricle associated with syncopal attacks. *International journal of cardiology* **118** , e24-26, doi:10.1016/j.ijcard.2006.11.251 (2007).
- 10 Dursun, M. *et al.* Cardiac hydatid disease: CT and MRI findings. *AJR. American journal of roentgenology* **190** , 226-232, doi:10.2214/ajr.07.2035 (2008).
- 11 Sarli, B. *et al.* Lone, Mobile Left Atrial Hydatid Cyst. *Texas Heart Institute journal* **43** , 261-263, doi:10.14503/thij-15-5261 (2016).
- 12 Zalaquett, E. *et al.* Imaging of Hydatid Disease with a Focus on Extrahepatic Involvement. *Radiographics : a review publication of the Radiological Society of North America, Inc* **37** , 901-923, doi:10.1148/rg.2017160172 (2017).
- 13 Gupta, A., Mishra, S. C., Jaiswal, S. & Pande, S. Intracardiac hydatid cyst located in right ventricular out-flow tract: a rare site. *Indian journal of thoracic and cardiovascular surgery* **37** , 588-590, doi:10.1007/s12055-021-01165-6 (2021).

Figure legends

Figure 1. **A** , Four chambers section of apex in transthoracic echocardiography image. An echocardiography demonstrated a weak-echo nodule located at the myocardium of the right ventricular apex (arrowhead). **B** , Cardiac hydatid cyst in CT image. A contrast-enhanced CT revealed a soft-tissue nodule within the interventricular septum near right ventricular apex without significant enhancement (arrowhead). **C** , Cardiac hydatid in MRI image. A contrast-enhanced MRI demonstrated no significant enhancement of the mass (arrow), while myocardium was significantly enhanced. **D** , Pathological image of excisional hydatid cyst (H&E, arrow).

