

COVID-19 after Thoracotomy in Patients with Pulmonary Hydatidosis

Somayeh Lookzadeh ¹, Kambiz Sheikhy ²,
Hamidreza Jamaati ¹, Reza Ghanbari ³, Vida
Mortezaee ¹, Kosar Najmi ¹, and Ali Akbar
Velayati ⁴

¹ Chronic Respiratory Diseases Research Center, National Research Institute of Tuberculosis and Lung Diseases (NRITLD), Shahid Beheshti University of Medical Sciences, Tehran, Iran, ² Lung Transplantation Research Center (LTRC), NRITLD, Shahid Beheshti University of Medical Sciences, Tehran, Iran, ³ Digestive Diseases Research Institute, Tehran University of Medical Sciences, Tehran, Iran, ⁴ Mycobacteriology Research Center, NRITLD, Shahid Beheshti University of Medical Sciences, Tehran, Iran.

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Correspondence to: Mortezaee V

Address: Chronic Respiratory Diseases Research Center, NRITLD, Shahid Beheshti University of Medical Sciences, Tehran, Iran

Email address: Vidamortezaee@gmail.com

Hydatidosis is one of the most important parasitic and zoonotic endemic infections caused by the larvae of cestode *Echinococcus granulosus*. Co-infection of hydatid cyst with the coronavirus disease 2019 (COVID-19), which is caused by the severe acute respiratory syndrome-coronavirus-2 (SARS-CoV-2), has been previously reported. The mortality rate of hydatidosis is reported to be 2-4% and the liver and lungs are the two most commonly involved organs, respectively. In the present study, we have reported two recovered pulmonary hydatidosis patients who were infected with SARS-CoV-2 after thoracotomy in the hospital. In general, current cases suggest that patients with thoracic surgery are more likely to develop severe infection with severe acute respiratory syndrome coronavirus 2 (SARS-COV-2). The patients presented COVID-19 symptoms shortly after thoracotomy and their viral tests were confirmed with the positive result of SARS-CoV-2 RT-PCR. In conclusion, possible differential diagnoses should be considered in similar cases and adequate attention should be paid to intraoperative and postoperative care.

Keywords: COVID-19; SARS-COV-2; Hydatid cyst; Thoracotomy; Hydatidosis; Case report

INTRODUCTION

Hydatidosis, which is a zoonotic endemic infection, is a significant parasitic disease caused by the larvae of the cestode *Echinococcus granulosus* (1-3). Due to the elasticity properties of lung parenchyma and the slow progression of echinococcal cysts, the resulting infection usually remains silent and asymptomatic for years, and the disease is usually diagnosed too late (4,5). The mortality rate of hydatidosis is reported to be 2-4% and the liver and lungs are the two most commonly involved organs, respectively (1, 3). The rate of mediastinal hydatid cyst has been reported 0.5 - 2.6% and may occur very rarely (6).

Co-infection of hydatid cyst with the coronavirus disease 2019 (COVID-19), which is caused by the severe acute respiratory syndrome-coronavirus-2 (SARS-CoV-2), has been previously reported (7). In the present study, we have reported two recovered pulmonary hydatidosis patients who were infected with SARS-CoV-2 after thoracotomy in the hospital.

CASE SUMMARIES

Patient 1

A 43-year-old housewife was admitted to Dr. Masih Daneshvari Hospital (the lung disease reference center) in

Tehran, Iran, with hypothyroidism, a history of cough for 6 months, mucous expectoration, hemoptysis, dyspnea, and shortness of breath. On primary examinations of the vital signs her respiratory rate (RR) was 20 /min, pulse rate (PR) was 101 /min, blood pressure (BP) was 90/60 mm Hg, O₂ saturation was 96%, and body temperature (T) was 36.5°C. Her nasopharyngeal swab test for SARS-CoV-2 was negative. In the further evaluation of the patient, the computed tomography (CT) scan revealed multiple cysts in the left and right hilum, which suggests hydatid cyst (Figure 1). Abdomen analysis showed one cyst in the right lobe of the liver. Immunoglobulin G (IgG) in serological diagnosis of *Echinococcus granulosus* (*E. granulosus*) was investigated by enzyme-linked immunosorbent assay (ELISA), and the result was positive. Finally, after the diagnosis of a cyst in the mediastinum, the patient underwent thoracotomy to clear the cyst. The histopathological analysis of pulmonary mass resection also showed hydatid cyst. The patient was started on oral albendazole (ABZ) at a dose of 400 mg twice a day.



Figure 1. Multiple cysts in the left and right hilum are suggestive of hydatid cyst

Two days after the thoracotomy, the patient experienced pulmonary embolism with a gradual decrease in oxygen pressure ($PO_2 = 93\%$), therefore an RT-PCR test for SARS-Cov-2 diagnosis was requested again. Due to the positive result of SARS-COV-2 RT-PCR as well as the result of thoracic CT, the patient was diagnosed with

COVID-19 (Figure 2). The patient was transferred to the COVID-19 ward and treatment with remdesivir, dexamethasone, and broad-spectrum antibiotics was started. Eleven days after surgery, regarding to the deterioration of the patient's general condition and increased shortness of breath, she was transferred to the COVID-19 intensive care unit (ICU). After a while, with improvement in symptoms and two negative RT-PCR for SARS-CoV-2 tests, the patient was discharged from the hospital. Two months later, in the postoperative follow-up after surgery, no serious complaints were observed.

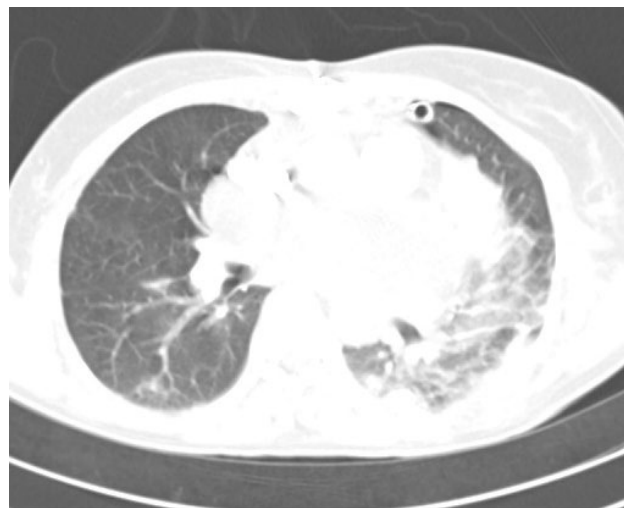


Figure 2. Bilateral diffuse patchy ground glass opacities are seen that are suggestive of atypical/viral bronchopneumonia such as COVID-19 infection.

Patient 2

A 63-year-old housewife was admitted to Dr. Masih Daneshvari hospital (the lung disease reference center) in Tehran, Iran, with dyspnea, shortness of breath, cough, chest discomfort, anorexia, fatigue, weight loss in the last 4 months without symptoms of nausea, vomiting, diarrhea, and fever. On initial clinical examination, the patient was suspected of COVID-19, but after additional tests such as RT-PCR for SARS-CoV-2 and spiral chest computed tomography (CT), she was diagnosed as hydatidosis with multiple bilateral masses associated with a cyst in the lung (Figure 3). The patient then underwent a thoracotomy to clear the cysts in the right lung (Figure 4). Histopathological results of pulmonary mass resection also

confirmed hydatid cyst and the patient was started on albendazole (ABZ) 400 mg twice a day.

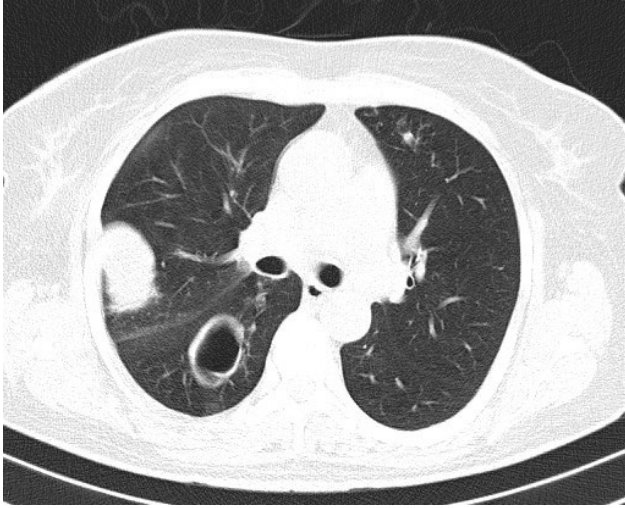


Figure 3. Multiple bilateral masses associated with a cyst in the lung

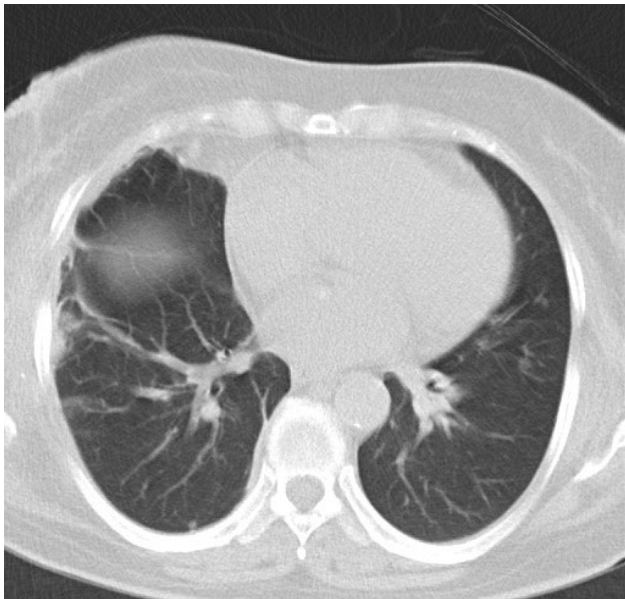


Figure 4. The spiral CT scan of the thorax after thoracotomy to clear the cysts in the right lung

Five days after the thoracotomy, due to the onset of fever and productive cough in the patient, an RT-PCR test against SARS-CoV-2 with a nasopharyngeal specimen was requested again. With a positive PCR result, she was transferred to the COVID-19 ward and was treated with azithromycin and lopinavir due to lack of severe lung involvement. 5 days later, she was discharged after two

continuous negative SARS-CoV-2 PCR tests, and two months later in the postoperative follow-up visit of the patient, no complaints were observed.

DISCUSSION

The symptoms of lung involvement by hydatid cyst include cough (53 - 62%), chest pain (49 - 91%), shortness of breath (10 - 70%), hemoptysis (12 - 21%) as well as fever (less common), are very similar to the COVID-19 symptoms (5). Since pulmonary hydatid cyst mimics COVID-19 infection, therefore their differentiation can be very effective in the treatment process.

Regarding the widespread prevalence of COVID-19 and the similar symptoms of hydatidosis and COVID-19 infection, initially, the patients studied in the present report were suspected of COVID-19 infection. After thoracic CT and negative result of SARS-CoV-2 RT-PCR, the patients were diagnosed with pulmonary hydatidosis and thoracotomy was performed on them to clear the pulmonary hydatid cysts. It is important to note that thoracotomy, as one of the high-risk surgeries especially during the COVID-19 pandemic, must be performed safely to prevent transmission of SARS-CoV-2 (8, 9). Our report shows that both patients in this study developed a COVID-19 infection a few days after thoracotomy. According to our observations, three hypotheses can be proposed:

a) Hydatid cyst may keep COVID-19 infection latent and prevent it from occurring.

To prove this hypothesis, comprehensive data from various studies are needed. Furthermore, specific antibodies against SARS-CoV-2 were not screened; therefore, due to these limitations, it cannot be conclusively shown that hydatid cyst infection can inhibit the activity and immune response to SARS-CoV-2. However, according to the available evidence, chronic and acute helminthic infections can reduce the levels of proinflammatory cytokines as well as type 1 cytokines response which leads to a reduction in mortality and complications in these infected patients (10).

b) Patients with active hydatidosis may not be infected with SARS-CoV-2.

By reviewing related studies, we found a recently published study that was performed by Matin et al. on hydatidosis and COVID-19 co-infection. They reported that patients with a history of hydatidosis have not been infected with SARS-CoV-2 (7). Therefore, there is a possibility of an interaction between hydatid cyst antigens and novel coronavirus proteins which prevent individuals from developing COVID-19, although proving this possibility requires further and more detailed studies. (7).

c) Thoracotomy surgery has caused these patients to develop COVID-19 infection.

There is some evidence indicating that patients with a history of thoracotomy become infected with the SARS-CoV-2 (11, 12). Stoleriu et al. in their study on 3 patients, who did thoracotomy, showed that all three patients became infected with the SARS-CoV-2 shortly after surgery (11). In this study, we reported two cases of pulmonary hydatid cyst with progressive dyspnea due to compression of cyst on the pulmonary mediastinum. These patients were initially misdiagnosed with COVID-19, regarding the pandemic of COVID-19 and their almost similar symptoms. The patients presented COVID-19 symptoms shortly after thoracotomy and their viral tests were confirmed with the positive result of SARS-CoV-2 RT-PCR.

In conclusion, possible differential diagnoses should be considered in similar cases and adequate attention should be paid to intraoperative and postoperative care.

Conflict of interest

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

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