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Case Report

Unilateral Lung Hydatid Cyst Resection Concomitant with Total Correction for Tetralogy of Fallot: A Case Report

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Abstract

A 9-year-old male presented to our emergency department with dyspnea on exertion, chest tightness and peripheral cyanosis. His oxygen saturation (SpO_2) on room air was 75%. Following admission, preoperative investigations including transthoracic echocardiography, chest radiography and laboratory examinations revealed Tetralogy of Fallot (TOF) and a unilateral pulmonary hydatid cyst. The diagnosis was confirmed intraoperatively.

Through a median sternotomy under cardiopulmonary bypass, the left lung hydatid cyst was successfully resected. The Ventricular Septal Defect (VSD) was repaired using a treated pericardial patch. The Right Ventricular Outflow Tract (RVOT) muscle bands were resected and the pulmonary trunk was enlarged with a pericardial patch.

Keywords: Hydatid Cyst; Teralogy of Fallot; *Echinococcus*; Albendazole

Introduction

Echinococcosis disease is the most common parasitic disease in the Asian and middle east countries, Cystic hydatid disease is an infection of the *Echinococcosis* (larval stage of *Echinococcus granulosus, Echinococcus multilocularis* or *Echinococcus vogeli*) in human [1]. Life cycle of this zoonotic disease (cestode/tapeworm) involves dogs as definitive hosts, sheep as intermediate hosts and human as accidental intermediate hosts. In humans it's rarely located in the heart (0.5%-2%) and frequently, infestations of the liver and lungs are 65% and 25% respectively [2]. Atrium (8%), the right atrium (4%) and the interatrial septum (2%) accordingly but if left untreated, can still result in life-threatening complications.

Tetralogy of Fallot is a cyanotic congenital heart disease that is composed of four parameters:

1. Ventricular Septal defect
2. Overriding of aorta
3. Pulmonary Valve Stenosis +, - sub valvular stenosis due to hypertrophied muscle bands.
4. Right ventricular hypertrophy

The right ventricle is hypertrophied due to pulmonary valve stenosis that causes pressure overload as result of that right ventricle gets hypertrophy and the location of aortic valve is over ridded to VSD, more than 50% of aorta locates toward right ventricle. The signs and symptoms are cyanosis, shortness of breath, failure to thrive, recurrent chest infection, tachypnea, sweaty. On auscultation there will be a loud systolic murmur, clubbing of nail beds and dry skin. The prevalence of this defect ranges from 3.5 to 5 per 10000 live births. TOF is the most common cyanotic congenital defect in Congenital Heart Disease (CHD) and counts about 10% of all congenital defects [3].

Case Presentation

A 9-years-old/child was admitted complaining of chest pain, palpitations and breathlessness with no fever, nausea and vomiting and no episodes of hemoptysis for a couple of years. Cyanosis was present Spo2 in room air was 75%. The patient denies any history of respiratory and gastrointestinal symptoms, diaphoresis, weight loss or rash. he was left untreated and his family history, drug allergies and medication history turned negative. As to his social history, no history of illicit drug abuse and he has never smoked. On physical examination BP was 85/60 mmHg, PR was 123bpm, ECG findings show right axes deviation with RV hypertrophy which is common in patients with Tetralogy of Fallot (TOF), Spo2 was 75% in room air, temperature was 37◦C and RR were 31 breaths per minute. Pre-operative CXR revealed prominent right ventricle and atrium (boot shape cardiac findings on X-ray) meanwhile normal vascular marking of lung, Computed Tomography (CT) revealed unilateral hydatic cysts in left hemithorax it was in the lower zone (inferior lobe). Enzyme Linked Immunosorbent Test (ELISA) with IgG, hemagglutination test for the infection of echinococcosis were not performed due to low socioeconomic status of the patient. Transthoracic echocardiography showed Tetralogy of Fallot. Other serology assessments were within normal ranges.

The patient underwent surgery thorough a median conventional sternotomy, followed by bicaval venous and ascending aortic cannulation , the heart arrested via cold anti-grade delnido cardioplegia , VSD was closed by treated pericardial patch via Right Atrium approach, RVOT (Right Ventricle Outflow Tract) muscle bands has been resected, pulmonary trunk opened, pulmonary valvutomy was done, pulmonary trunk + upper part of RVOT enlarged by pericardial patch in accordance with Heggar dilator that is chosen according to weight of patient. then left pleura was opened the hydatic cysts was found, palpated, needle aspirated, pivodin injected inside the cyst and kept for 10 minutes, cyst Cover opened and Cyst removed with all layers including the germinal layer, inner layer, outer layer and daughter cysts, the cavity was ligated (purs-string suture ligation) the patient weaned off the cardiopulmonary bypass in stable condition, 2 chest tubes applied and chest closed. The postoperative course was uneventful. Albendazole was prescribed 10 mg/kg/day for 6 months post-operation, along with decongesting and anti-arrhythmic drugs (Fig. 1-4).

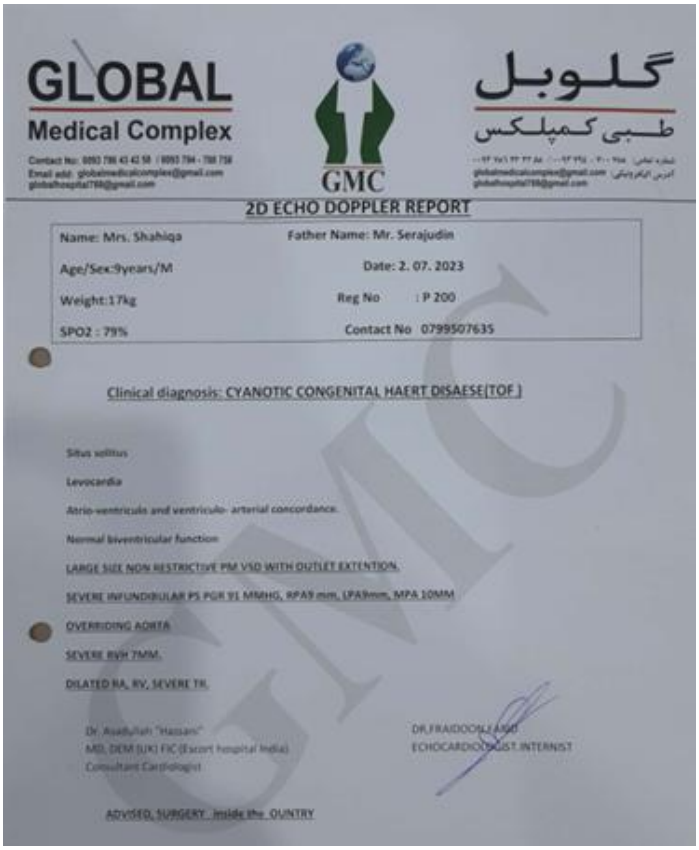
GLOBAL
Medical Complex
گلوبل
طبی کمپلکس
GMC
2D ECHO DOPPLER REPORT
Name: Mrs. Shahiqa
Father Name: Mr. Serajudin
Age/Sex:9years/M
Date: 2. 07. 2023
Weight:17kg
Reg No : P 200
SPO2 : 79%
Contact No 0799507635
Clinical diagnosis: CYANOTIC CONGENITAL HAERT DISAESE(TOF)
Situs solitus
Levocardia
Atrio-ventricula and ventriculo- arterial concordance.
Normal biventricular function
LARGE SIZE NON RESTRICTIVE PM VSD WITH OUTLET EXTENTION.
SEVERE INFUNDIBULAR PS PGR 91 MMHG, RPA9 mm, LPA9mm, MPA 10MM
OVERRIDING AORTA
SEVERE RVH 7MM.
DILATED RA, RV, SEVERE TR.
Dr. Asadullah "Hassan"
MD, DIEM (UK) FIC (Escort hospital India)
Consultant Cardiologist
DR.FRAIDOON
ECHOCARDIOLOGIST.INTERNIST
ADVISED, SURGERY inside the OUNTRY

Figure 1: Echocardiography report, reporting Tetralogy of Fallot (TOF).

Figure 2: Chest X-ray showing boot shape finding of TOF patient + hydatic cyst lower lobe of the left lung.

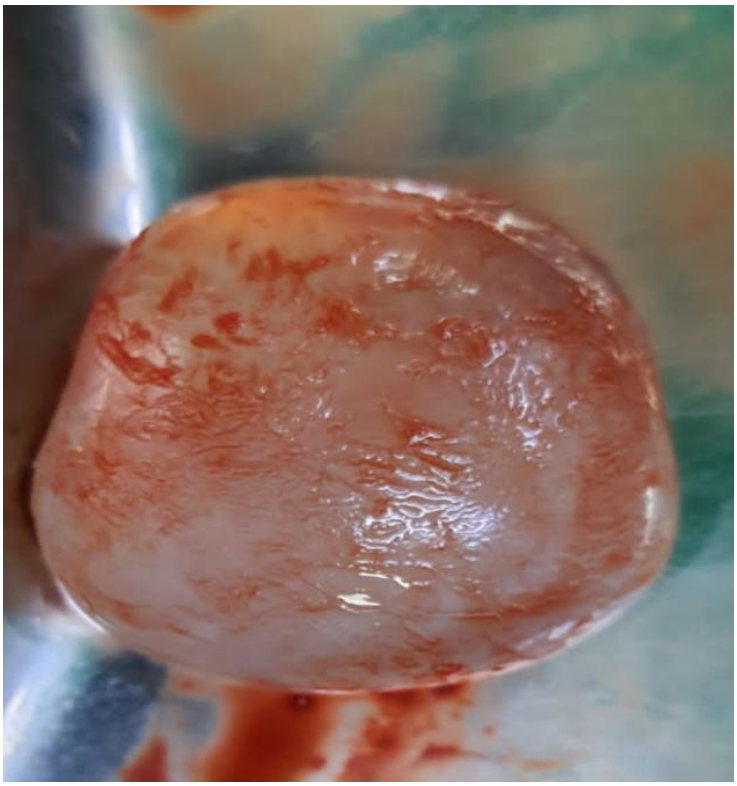

Figure 3: Resected hydatic cyst from the left lung.

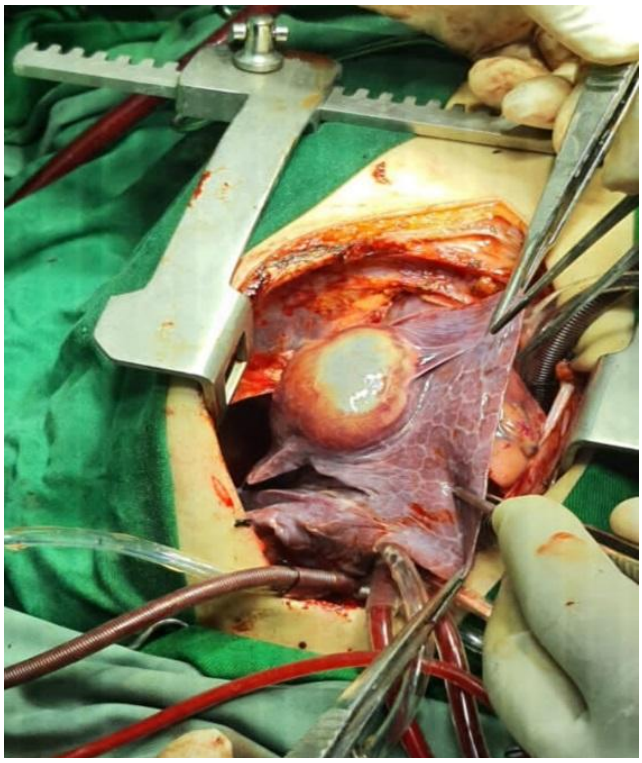

Figure 4: Hydatic cyst in the left lung.

Clinical Symptoms

Hydatid cyst of the lung results from the approach of the ova (hexacanth embryos) into the human intestine and entering into the portal or the lymphatic system where it travels from the vascular beds of the lungs or the liver into either the coronary circulation to invade the myocardium or the portal system to invade the right side of the heart. The signs and symptoms of lung hydatic cyst includes shortness of breath, cough, fever, loss of appetite, weight loss, in case of ruptured hydatic cyst to the bronchus, the content of cyst which could be the fluid and daughter cyst will be seen in sputum or after coughing. Unilateral hydatic cyst along congenital heart defect is very rare case the prevalence is unknown. The most important point in this scenario is that if this parasite's egg (Alveolar echinococcus egg which primary host is the dogs, secondary is the sheep, human can be affected either by infected sheep's meat or contaminated vegetables with AE eggs), enters the body, travels to liver then to heart and lungs since there is the septal defect directly can enter in to circulatory system and migrate to anywhere in the body, including the brain and heart itself.

Result

Unilateral hydatid cyst of the lung along with cyanotic congenital heart defect Tetralogy of Fallot (TOF) is very rare and clinically may present with different signs and symptoms, hence due to tow importance 1 - high risk of transmitting to heart via venous system and paradoxically migrating through main circulatory system to any part of the body rapidly, 2 - if the lung hydatic cyst ruptures the lung will be collapsed the pulmonary blood saturation will be decreased further, since the patient' pulmonary vascular system is already under loaded due to pulmonary stenosis and mixing of saturated and de-saturated in the VSD, at last; it is worth to mention that as soon as possible the defect should be repaired in standard way using CPB and the pleura should be opened and cyst resected, followed by medical therapy for at least one year post-surgery as the treatment of choice for hydatosis and six months for the TOF. Echocardiographic and serology studies and chest X-ray are recommended for 2 years to catch recurrences hyadatosis post operation and evaluation of heart function post total correction [4,5].

Discussion

Tetralogy of Fallot (TOF) is the most common cyanotic congenital heart disease, characterized by Ventricular Septal Defect (VSD), Right Ventricular Outflow Tract (RVOT) obstruction, overriding aorta and right ventricular hypertrophy. Patients typically present with cyanosis, dyspnea on exertion and reduced oxygen saturation, as observed in our case. Pulmonary hydatid disease, caused by *Echinococcus granulosus*, remains endemic in many regions and commonly affects the liver and lungs [6-9]. The

coexistence of TOF and unilateral pulmonary hydatid cyst is extremely rare and poses unique diagnostic and surgical challenges. In this patient, the presence of severe hypoxemia (SpO_2 75% on room air) was primarily attributable to TOF; however, the lung cyst likely contributed to compromised respiratory function. Simultaneous management of both conditions during a single operative session required careful intraoperative planning. Median sternotomy under cardiopulmonary bypass allowed adequate exposure for complete intracardiac repair and safe resection of the pulmonary hydatid cyst. Complete excision of the cyst is essential to prevent rupture, anaphylaxis and recurrence. Meanwhile, standard corrective surgery for TOF including VSD closure with a pericardial patch, resection of RVOT muscle bands and enlargement of the pulmonary trunk was successfully performed.

The decision to perform a single-stage surgical approach minimized the risks associated with multiple operations and repeated anesthesia exposure. Multidisciplinary coordination was crucial to ensure hemodynamic stability and prevent intraoperative complications [9].

Conclusion

This case highlights the importance of thorough preoperative evaluation in cyanotic congenital heart disease patients, particularly in endemic regions where parasitic infections may coexist. Early diagnosis and carefully planned surgical intervention can result in favorable outcomes even in complex and rare clinical scenarios.

Conflict of Interest

The authors declared no potential conflicts of interest with respect to the research, authorship and/or publication of this article.

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Data Availability Statement

Not applicable.

Ethical Statement

The project did not meet the definition of human subject research under the purview of the IRB according to federal regulations and therefore, was exempt.

Informed Consent Statement

Informed consent was taken for this study.

Authors' Contributions

All authors contributed equally to this paper.

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