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Congenital heart disease and pulmonary tuberculosis

Case Report

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Abstract: A 13-year-old boy with atrial septal defect and tricuspid valve abnormality was reported. He had crepitan ralles and signs of heart failure. He was treated with digital, diuretic and antimicrobial therapies. After clinical improvement he underwent surgery. The atrial septal defect was closed, and ringplasty was applied to the tricuspid valve. After the operation, he could not be extubated because of respiratory failure. On the seventh day following the surgery, he developed pneumothorax and hyportension and died. Postmortem examination showed bilateral diffuse pulmonary tuberculosis. The aim of this report is to emphasise the association of tuberculosis and congenital heart disease.

Keywords: *Pulmonary tuberculosis • Congenital heart disease • Surgery*

1. Introduction

In spite of recent developments in diagnostic and therapeuthic methods, tuberculosis is still the most common chronic illness and death causing infection [1]. Pulmonary tuberculosis is seen more in congenital heart disease (CHD); especially in those which increase lung circulation [2] than the normal population. As the symptoms of CHD may disguise pulmonary tuberculosis, diagnosis is usually delayed or even missed [3].

In this article, the history of 13-year-old male patient with diffuse pulmonary tuberculosis diagnosed in the autopsy who had tricuspid valve pathology and secundum atrial septal defect (ASD) and died postoperatively after cardiac surgical correction, is discussed in order to associate the dangers of simultaneously having CHD and tuberculosis.

2. Case Report

A thirteen year-old male patient came with complaints of dyspnea, cyanosis and aesthenia experienced over the last five years. He was diagnosed with ASD when he was one year old, and he did not have any complaints until five years ago. His parents were first degree relatives, and his mother took therapy due to pleuritis, but her health records were not available.

His height was 130 cm (< 3 persentil), body weight 20 kg (< 3 persentil), respiration rate 48/minute, heart rate 148/minute, blood pressure 90/60 mmHg and temperature was 37.5^0 C. The patient had cyanosis and chest diameter was enlarged; there was widespread ralles in lung area. Apex was hyper dynamic; systolic thrill was palpated at the parasternal region; S2 was increased and there was 4/6 degree pan-systolic murmur heard best under xsiphoid region. Liver was palpable 3 cm under costal margin and pretibial edema was observed.

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Figure 1. Cardiomegally and wide pulmonary infiltretion in patient's chest X-Ray at antero-posterior position.

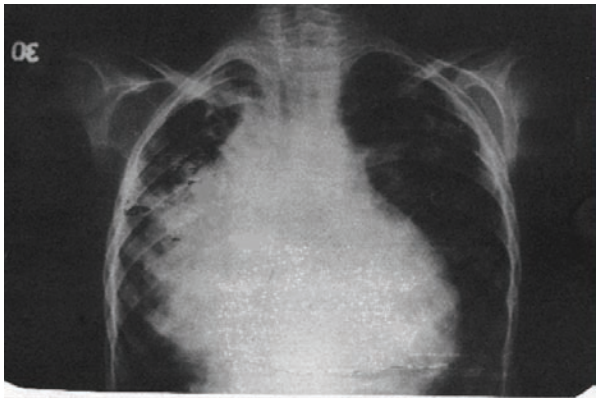
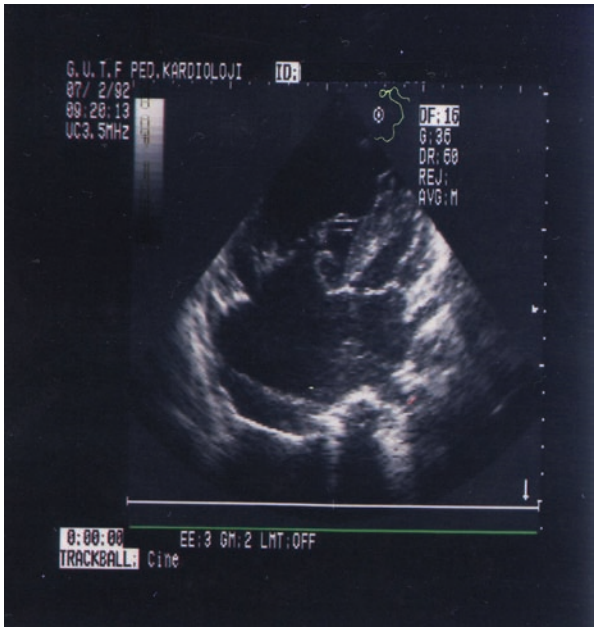


Figure 2. Short papillary muscle of septal division of tricuspid valve and atrial septal defekt in echocardiogram at apical four chamber view.

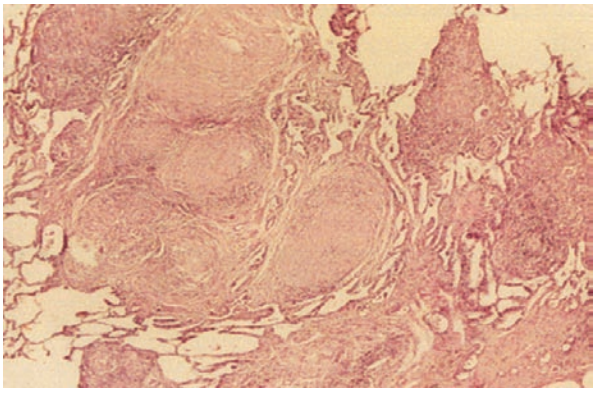


In laboratory examinations: Haemoglobin 11.3 gr/dl, white blood cell count 25100 / mm3, erythrocyte sedimentation rate was measured as 4mm/hour and C-reactive protein was negative. Total protein was 6.8 gr/dl, albumin was 3.1 gr/dl, SGPT was 80 IU and other biochemical and urinary parameters were normal.

Evidence of *M. Tuberculosis* infection could not be obtained from pharyngeal swab and gastric juice specimens by staining for acid-fast bacilli (AFB) from repeated examinations,with a polymerase chain reaction (PCR) specific for tuberculosis, nor with cultures.

The electrocardiogram showed mild PR elongation (0.16 sec.), right axis deviation, right atrial dilation and right ventricle hypertrophy.

Figure 3. Multiple granulomas composed of epithelioid histiocytes surrounded by lymphocytes and Langhans type giant cells, and emphysematous changes in the peripheral parenchyma.



On his chest X-Ray, there was cardiomegaly and wide pulmonary infiltration (Figure 1). In his echocardiography, chordas and papillary muscles of septal division of tricuspid valve were short, presence of a prominent regurgitation from the tricuspid valve filling the whole right atrium, and there was also an ASD (Figure 2).

His cardiac catheterization confirmed the diagnosis of tricuspid valve pathology, ASD and pulmonary hypertension. Because of congestive heart failure and pneumonia findings, he was prescribed anticongestive therapy antibiotics. After fifteen days, findings of lung auscultation and pretibial edema were no longer detected and respiratory distress decreased after fever was suppressed. Four weeks later the patient underwent surgery. In the operation, ASD was repaired with pericardial patch and ring plasty was performed on the tricuspid valve. Despite respiratory support, the patient did not recover blood gases in the post-operative period. The patient could not be put off the ventilator because there was either no recovery on the blood gases or not enough expansion on the lungs was obtained. The patient developed pneumothorax and hypotension, and died on the seventh day following surgery as a result of cardiopulmonary arrest. In the autopsy, both lungs were found to be infected by large areas of granulomatous tissues with yellow-grey caseous material, especially around the middle section of the lungs. Histologically, there were multiple granulomas composed of epithelioid histiocytes surrounded by lymphocytes and Langhans type giant cells. There were also emphysematous changes found in the peripheral parenchyma (Figure 3).

3. Discussion

Despite developing treatment and diagnostic processes, it is estimated that, every year 1.3 million children under the age of 15 experience tuberculosis in the world and of those, 450,000 die [4]. Tuberculosis is usually seen in developing countries, from issues such as poor environmental conditions, poor feeding, insufficient vaccine maintenance and also HIV infection [5,6].

Tuberculosis is difficult to diagnose in children since 65% of pediatric patients are asymptomatic and they are only diagnosed by radiology [7]. The children, who have radiological findings, are usually diagnosed when adults with tuberculosis are screened as well [8].

Radiological findings of pulmonary tuberculosis are seen in wide spectrum. Tsao et al. described these as diffuse bronchogenic propagation: alveoler pattern, multiple diffuse opacities and cavities, diffuse hematological propagation: interstitial pattern, typical or atypical miliary lesions (nodules and reticular pattern) [9]. If lesions are seen on all of the 5 pulmonary lobes on the X-ray, it is diagnosed as diffused pulmonary tuberculosis, which has a high mortality rate. When there is a mass or there are diffuse interstitial lesions, it is harder to diagnose. Patients with diffuse hematological and bronchgenic spread are lost from respiratory failure developed after adult respiratory distress syndrome (ARDS). In our case, radiological findings covered with nonspecific pneumonia and some alterations are considered to be secondary to heart failure. Autopsy findings showed both lungs were massively infected. Operation and general anesthesia as Tsao et al. described resulted in respiratory failure in our patient.

It is known that tuberculosis is more common in CHD patients than in normal population. In a retrospective study, Van der Merwe et al. found that pulmonary tuberculosis is 2.5 times common in children with CHD than the normal population, and is also significantly more common in CHD with cyanotic heart diseases and increased pulmonary circulation such as transposition of great arteries and noncyanotic ones similar to ASD and ventricular septal defect (VSD) [2].

In Ifere et al., two cases were reported with CHD and pulmonary tuberculosis. As tuberculosis couldn't be diagnosed at that time because CHD's clinical symptoms disguise pulmonary tuberculosis symptoms, it led to the delay of treatment [3]. In our case, the patient's weakness and respiratory distress were considered to be symptoms of untreated congestive heart failure and pneumonia. However, PPD testing and bacteriological screening of gastric juices were performed because tuberculosis is endemic in our country and the patient did not have a scar from BCG. A negative PPD test usually indicates that the patient is not infected. It was reported that 10% of the children who have a normal immune system has tuberculosis evident from TB-positive culture, responded 5 TU PPD test as negative. Other factors belonging to the patient such as: younger age, inadequate nutrition, viral infections and disseminated miliary tuberculosis, affects negative PPD results [10]. Low T4/T8 ratio and hypoalbuminemia also cause negative PPD [11]. Our patient's negative PPD may be explained by diffuse pulmonary tuberculosis, hypoalbuminemia, inadequate nutrition and a possible secondary infection. However, considering that culture-positive tuberculosis cases and PPD sensitivity was found in 51% for the study done with Argentinean children [12], PPD does not appear to be an adequate diagnostic tool.

The gold standard of tuberculosis diagnosis is bacteriologic diagnosis in adults. However, sputum smears are positive in 10%–15% of children diagnosed with tuberculosis, and confirmation by culture is achieved in only 30%–40% [13,14]. In adult tuberculosis, mucus acid resistant bacteria can be shown in up to 75%; in children this ratio stays at 20% [12]. It is claimed by Starke et al. that hunger gastric secretion is more appropriate than samples taken by bronchoscopy for tuberculosis culture [8]. Microscopic and cultural examinations of our patient's gastric juice did not show any tuberculosis bacillus in spite of the severe pulmonary tuberculosis.

It is not easy to diagnose tuberculosis in children. The BACTEC radiometric system, ELISA tests and polymerase chain reaction tests are new and effective and reliable methods for tuberculosis diagnosis. It is possible to diagnose tuberculosis infection using polymerase chain reaction (PCR) in shorter time than the other two alternatives. However, its sensitivity is low in children with isolated pulmonary tuberculosis [15,16]. In cerebrospinal fluid this method is more sensitive and it is stated that standardization of taking hunger gastric juice can be more effective [17]. In the absence of a reliable standard for the diagnosis of pediatric tuberculosis, clinical case definitions are very important for surveillance.

The importance of autopsies is unquestionable as a diagnostic measure. If an autopsy was not conducted on our patient, the death would probably be attributed to effects from the surgery and the actual underlying cause, a severe pulmonary tuberculosis infection, would not have been determined. In India, Sarode et al. investigated autopsies in 1000 patients between the ages of 15 and 59 who died in hospitals. He found infectious disease as the most common cause of death (46.8%), 66.7% of them were correctly diagnosed, with tuberculosis was making up 33.8% of the infections, while 82% of

patients were accurately diagnosed. In other words, it is reported that 18% of the patients died from misdiagnosis [18]. Despite the fact that an autopsy is not applicable for all patients, it is evident that suspicion of potential tuberculosis should be kept in mind for similar patients. Screening of the family members and any persons the patient has had close contact with would be beneficial for their health.

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