Case Report

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A Case Report on a Patient with Tetralogy of Fallot and CNS Tuberculosis

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ABSTRACT

BACKGROUND AND OBJECTIVE: Central nervous system (CNS) tuberculosis (TB) is one of the extrapulmonary manifestations of mycobacterium tuberculosis. Cerebrovascular accidents and cerebral abscesses in children constitute 5 to 18.7% of all cases. Therefore, a child with congenital heart disease (Tetralogy of Fallot) and neurological manifestations consistent with brain abscess and suffered from CNS tuberculosis.

CASE PEPORT: The patients is a 10-year-old boy with Tetralogy of Fallot who underwent ceftriaxone, vancomycin and anticonvulsant treatments with initial suspicion of central nervous system infection and with symptoms of fever, seizures and decreased consciousness. Due to observation of cerebral edema and several lesions in brain parenchyma in CT scans in the form of abscess, corticosteroid and metronidazole was added to the treatment process and the patient underwent cerebrospinal fluid analysis. Considering low sugar of cerebrospinal fluid, improved brain image and at the same time, lack of clinical recovery, we suspected mycobacterium tuberculosis. Therefore, the cerebrospinal fluid PCR was sent and the experimental anti-tuberculosis treatment started. Finally, the result was positive in terms of mycobacterium and anti-tuberculosis treatment continued.

CONCLUSION: Tuberculosis as the cause of disease manifestations in endemic areas should always be taken into consideration. To justify patient symptoms with more common causes, one should not discard other diagnoses; because early diagnosis of CNS tuberculosis prevents certain death.

KEY WORDS: *Tetralogy of Fallot, Tuberculosis, Congenital Heart Disease*.

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Introduction

Tuberculosis can affect any organ. The involvement of the nervous system includes about 6% of all extra-pulmonary manifestations of the disease (1–3). The most common age is from 6 months to 4 years (2–4). Central nervous system in tuberculosis can manifest itself in three forms of tuberculous meningitis, intracerebral tuberculosis and spinal tuberculosis. The clinical manifestations of the disease are described in three stages. The first stage, which lasts about three weeks, occurs with fever and lethargy, loss of appetite, headache and personality changes.

The second stage is characterized by meningismus, vomiting and neurological symptoms. The third stage is associated with paralysis of the limbs, cranial nerves involvement, decreased level of consciousness, seizures and death, which will take about 8 weeks after the onset of the disease. The prevalence of tuberculosis in untreated patients is about 0.3%, which will lead to death if not detected in the early stages (5,6).

Diagnostic methods include biopsy and clinical examination, sputum culture and smear, cerebrospinal fluid analysis, chest X-ray, CT scan and brain MRI, and nucleic acid amplification tests (NAATs) (1,6,7). Patients with congenital heart disease such as tetralogy of fallot, especially in more than two years of age, are prone to cerebral abnormalities and are more prone to cerebrovascular thrombosis in less than two years of age. The percentage of brain abscess ranges from 5% to 18.7% in these patients.

Therefore, these patients may refer with manifestations of the involvement of the central nervous system, and patients are diagnosed with any kind of brain infection (1, 6, 8–13). Considering the need for timely diagnosis of tuberculosis and its treatment to prevent neurological complications and considering brain abscesses in children with heart disease and misleading diagnosis of rare infections, we decided to present a child with tetralogy of fallot with the involvement of tuberculosis.

Case Report

A 10-year-old boy with tetralogy of fallot and Pulmonary atresia with ventricular septal defect (PA-VSD) who has symptoms of upper respiratory tract infection, cough and sputum, fever, decreased level of consciousness and seizure. The patient mentions experiences of headache, vomiting and lethargy about 1 –2 weeks before referral. Repeated cyanosis attacks followed. Surgical treatment was delayed due to socioeconomic problems. The patient has stopped taking heart medications regardless of the physician's recommendation. Growth failure was observed in the history of the family's second child due to probable underlying and economic problems. The patient's mother mentions the history of diabetes mellitus type 2. There has been a history of frequent admissions due to heart problems.

The level of consciousness was reduced at the time of arrival and the patient's Glasgow Coma Scale was 8 out of 15. There was no sign of respiratory distress. Pansystolic heart murmur could be heard. Patient had finger clubbing and in bilateral lung auscultation, rhonchi could be heard.

The patient's vital signs included: PR: 90, RR: 22, BP: 100.80 and T: 39, and the patient started receiving treatments with antibiotics (ceftriaxone and vancomycin) and anticonvulsants with primary suspicion of central nervous system infection. Considering the underlying cardiac disease and according to the brain CT scan profile of a patient with the same severe abscess, the empirical therapy of the brain abscess started by adding metronidazole to the regimen. The initial tests started for the patient:

WBC : 11600	AST : 17
HG : 14.7	ALT : 7
PLT : 187000	Mg : 2.5
PMN : 87%	PH : 7.44
LYMPH : 9%	HCO3 : 27
MON : 12%	PCO2 : 38
CRP : 80	SO2 : 85.5
ESR : 16	PO2 : 55.5
Na : 135	U\A : NL
K : 3.8	PT : 13.5
BUN : 11	PTT : 38
Cr : 6	IN
Ca : 8.5	R : 1

Chest x-ray was normal. Patient's echocardiography revealed no evidence to support heart failure or endocarditis. Brain CT scan with contrast for the patient indicated multi-focal areas with a distinct circular view and cerebral edema, and rejected the cerebrovascular problems (Fig 1,2). Approved by the neurologist, corticosteroids were added to the patient's treatment. The cerebrospinal fluid was extracted, cultured and analyzed as follows:

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Color:yellow	Direct smear: Neg
Wbc:55	Csf culture: Neg
Polky:30	Glu:<10
Lymph:70	Protein:192
Rbc:3	

Considering low sugar in cerebrospinal fluid, quick recovering response of brain CT scan, ventriculomegaly, periventricular edema in CT scan and stable process of clinical symptoms, the cerebrospinal fluid was sent for acid-fast smear and mycobacterium PCR and Mantoux and IGRA (Interferon Gamma Release Assay) tests were sent, and test results were negative.

Subsequently, anti-tuberculosis treatment started immediately, which included isoniazid, rifampin, ethambutol and streptomycin. Seven days after the beginning of the initial empirical therapy, a positive response was reported in favor of tubercle bacillus. Finally, one week after the beginning of anti-tuberculosis treatment, complete cessation of antibiotics, full examination of the patient's family and positive result for sputum culture and smear of patient's father, significant recovery was observed in the patient and he underwent long-term treatment of brain tuberculosis.

Ultimately, the patient was followed up with neurological complications, feeding through the oral tube, anti-tuberculosis treatment and work therapy.

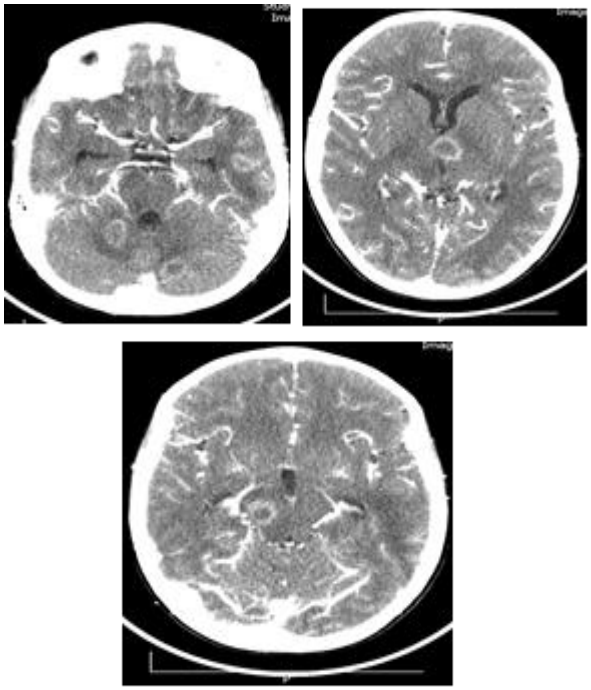

Figure 1. The initial brain CT scan

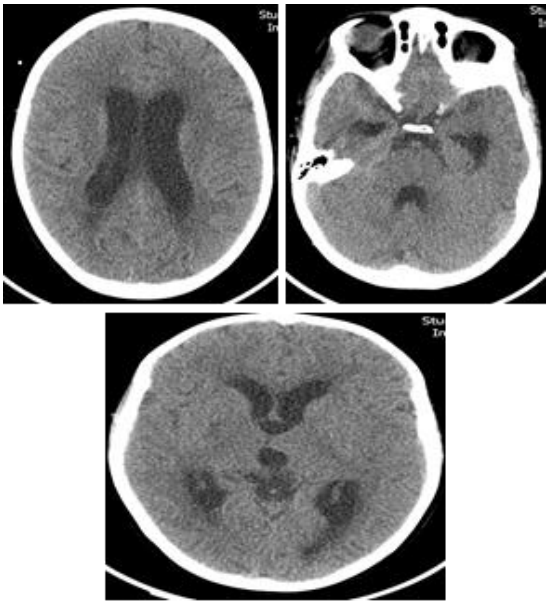

Figure 2. Brain CT scan after treatment

Discussion

Multifocal cerebral involvement, dramatic response to corticosteroid, lesions fading, low sugar in cerebrospinal fluid were useful in timely diagnosis of the disease. The physician's vigilance in rejecting the rare causes of differential diagnosis in congenital heart patients was a crucial point in timely treatment. So that high prevalence of brain abscess in congenital cyanotic heart patients did not lead to delay in diagnosis (1, 6). In 2013, a 15-year-old teenager was reported similar to our case, diagnosed based on cerebrospinal fluid PCR results.

The next reported child only had pulmonary tuberculosis, which was completely different from the manifestations of the presented patient. The scarcity of cases may be due to high mortality of both diseases (14, 15). Several cases of concomitant cyanotic and pulmonary disease have been reported, first reported in adults and secondary to central nervous system involvement. There have been several reports of the relationship between cyanotic heart disease and pulmonary tuberculosis, which was in adults and had no central nervous system involvement. However, any immunosuppressive disease at any age may be a manifestation of mycobacterium tuberculosis, which may have been a factor in our patient, but there was no clear indication to justify the disease in cardiac examination (16-18).

Tetralogy of fallot is a congenital heart disease that may have neurological manifestations and cerebral thrombosis, especially in children under 2 years of age,

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and is manifested with multiple cerebral thrombosis in children above 2 years of age. Given the age of the child presented here, the abscess prevalence appears to be less. On the other hand, the response to the treatment of the abscess in advanced stages, especially the radiological response, occurs at a slower pace, which was the opposite in our patient, leading to suspicion to other intervening causes (14, 19).

Tuberculous meningitis is more common in endemic areas, especially in Iran (20). The history of contact with a person with cerebral tuberculosis is reported in about 50% of people with tuberculosis, which is negative in our patient. When the symptoms and tests are unusual and the symptoms are justified by more cases of the diseases, we cannot easily be free from tuberculosis concerns. This is more important in case tuberculous meningitis, especially in chronic and subacute conditions. By employing the sensitive method of PCR, it will be possible to detect a small amount of bacillus in the sample over a short period of time (21, 22). Brain tuberculosis is caused by the accumulation of granuloma inside the brain parenchyma, which can be multiple or single and is usually caused by hematogen bacillus tuberculosis diffusion, which was diffused in our patient, and was very similar to the cerebral lesions of tetralogy of fallot. Therefore, simultaneous diagnosis of two complications was very important (23, 24). Tubercle bacillus is diagnosed according to acid-fast staining, PCR, brain imaging, and typical findings of circular lesions with a specific margin. In our patient, despite the negative results of the Mantoux and IGRA test, the PCR of the spinal cord was positive, which is important in this regard (1, 7, 25, 26).

The prognosis of the disease depends entirely on the early diagnosis and early treatment. The disease will eventually lead to death in the final stages (27,28). Consequently, underlying cardiac disease did not lead to a therapeutic mistake, and with the onset of patient treatment and evidence of recovery, the patient was rescued. Patient recovery is important and interesting despite the secondary stages of tuberculosis in the patient. This condition should be considered in endemic areas in each patient with loss of consciousness and neurological disorder.

This interesting case with the manifestation and justification of brain abscesses in a patient with tetralogy of fallot, which ultimately led to the diagnosis of tuberculosis, points out that tuberculosis in endemic areas, especially Iran, should always be considered seriously and one should not discard other diagnoses to justify symptoms of a patient with more common causes, like what was said about the presented patient, because timely diagnosis of tuberculosis prevents definite death.

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References

1.Robert M, Kliegman B, Stanton J . Geme N, Schor F, Nelson textbook of pediatrics, Vol 2, 20th ed: Elsevier; 2015.P.1445-57.

2.Leonard JM. Central nervous system tuberculosis. Microbiol Spectr. 2017;5(2):0044-2017.

3.Rock RB, Olin M, Baker CA, Molitor TW, Peterson PK. Central nervous system tuberculosis: pathogenesis and clinical aspects. Clin Microbiol Rev. 2008;21(2):243-61.

4.Farinha N, Razali K, Holzel H, Morgan G, Novelli V. Tuberculosis of the central nervous system in children: a 20-year survey. J Infect. 2000;41(1):61-8.

5.Thwaites G, Fisher M, Hemingway C, Scott G, Solomon T, Innes J, et al. British Infection Society guidelines for the diagnosis and treatment of tuberculosis of the central nervous system in adults and children. J Infect. 2009;59(3):167-8.

6.Cherry JD, Harrison GJ, Kaplan SL, Hotez PJ, Steinbach WJ. Feigin and cherry s textbook of pediatric infectious diseases: Elsevier/Saunders; 2014.P.1335-6.

7.McMullen SE, Pegues DA, Shofer FS, Sheller AC, Wiener EB. Performance of QuantiFERON®-TB Gold and Tuberculin Skin Test Relative to Subjects' Risk of Exposure to Tuberculosis. Clinical infectious diseases. 2014;58(9):1260-6.

8.Sethi S, Kapil S. Scalp block for brain abscess drainage in a patient with uncorrected tetralogy of fallot. World J Clin Cases. 2014;2(12):934.

9.Clarkson PM, Gomez MR, Wallace RB, Weidman WH. Central nervous system complications following blalock-taussig operation. Pediat. 1967;39(1):18-23.

10.Michel ND, Sokolov IM. Clinical case of brain abscess in a patient with tetralogy fallot. Kardiologiia. 2016;56(2):85-90.

11.Chakraborty RN, Bidwai PS, Kak VK, Banarjee AK, Khattri HN, Sapru RP, et al. Brain abscess in cyanotic congenital heart disease. Indian Heart J. 1989;41(3):190-3.

12.Adebayo BE, Ogunkunle OO, Ayun FO. Meningitis and brain abscess: First but fatal presentation in a child with tetralogy of fallot. J Cardiol Case. 2016;13(3):72-4.

13.Sarkar A, Ahmed I, Chandra N, Pande A. Pulmonary endarteritis, cerebral abscesses, and a single ventricle: An uncommon combination. J Cardiovascul Dis Res. 2012;3(3):236-9.

14.Desai N, Gable B, Ortman M. Tuberculous brain abscess in an adolescent with complex congenital cyanotic heart disease. Heart. 2013;99(16):1220-1.

15.Grzeskowski J. Case of congenital heart defect (tetralogy of Fallot) complicated by pulmonary tuberculosis. Polski Tygodnik lekarski. 1954;9(23):718-9.

16.Gunay E, Gunay S, Karakus G, Sahin T, Gorgun D, Tursun I, et al. Pulmonary tuberculosis in an adult patient with tetralogy of Fallot. Hippokratia. 2012;16(3):286.

17.Mikinka F, Bankowski M. Congenital cyanotic heart disease complicated by pulmonary tuberculosis. Pol Tyg Lek. 1953;8(12):450-2.

18..Radovic M, Ristic L, Stankovic I, Petrovic D. Rare congenital heart disease as a cause of tuberculosis activation. Med Pregl. 2010;63(7-8):565-9.

19.Fischbein CA, Rosenthal A, Fischer EG, Nadas AS, Welch K. Risk factors for brain abscess in patients with congenital heart disease. Am J Cardiol. 1974;34(1):97-102.

20.Organization WH. Incidence of tuberculosis (per 100,000 people). World Health Organization, Global Tuberculosis Report. 2013Available From: http://data.worldbank.org/indicator/SH.TBS.INCD.

21.Jarvis JN, Meintjes G, Williams A, Brown Y, Crede T, Harrison TS. Adult meningitis in a setting of high HIV and TB prevalence: findings from 4961 suspected cases. BMC Infect Dis. 2010;10(1):67.

22.van der Weert EM, Hartgers NM, Schaaf HS, Eley BS, Pitcher RD, Wieselthaler NA, et al. Comparison of diagnostic criteria of tuberculous meningitis in human immunodeficiency virus-infected and uninfected children. Pediat Infec Dis J. 2006;25(1):65-9.

[DOR: 20.1001.1.15614107.1396.19.6.9.0]
[DOI: 10.22088/jbums.19.6.10]

23.Rajshekhar V, Haran R, Prakash GS, Chandy MJ. Differentiating solitary small cysticercus granulomas and tuberculomas in patients with epilepsy: clinical and computerized tomographic criteria. J Neurosurg. 1993;78(3):402-7.
24.Naidoo P, Van Niekerk M, Du Toit E, Beyers N, Leon N. Pathways to multidrug-resistant tuberculosis diagnosis and treatment initiation: a qualitative comparison of patients' experiences in the era of rapid molecular diagnostic tests. BMC Health Servic Res. 2015;15(1):488.
25.Pai M, Zwerling A, Menzies D. Systematic review: T-cell–based assays for the diagnosis of latent tuberculosis infection: an update. Ann Int Med. 2008;149(3):177-84.
26.Ravn P, Munk ME, Andersen ÅB, Lundgren B, Lundgren JD, Nielsen LN, et al. Prospective evaluation of a whole-blood test using Mycobacterium tuberculosis-specific antigens ESAT-6 and CFP ١٠-for diagnosis of active tuberculosis. Clin Diagnos lab Immunol. 2005;12(4):491-6.
27.Phypers M, Harris T, Power C. CNS tuberculosis: a longitudinal analysis of epidemiological and clinical features. Int J Tuberculos Lung Dis. 2006;10(1):99-103.
28.Buonsenso D, Serranti D, Valentini P. Management of central nervous system tuberculosis in children: light and shade. Eur Rev Med Pharmacol Sci. 2010;14(10):845-53.

[DOR: 20.1001.1.15614107.1396.19.6.9.0]
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