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Case Report

A Rare Presentation of Brain Abscesses in an 18-Year-Old Male with Undiagnosed Tetralogy of Fallot

Shafaq Nazia Shaikh, Iffat Jamal, Fareeha Bhatti

Liaquat University of Medical and Health Sciences, Jamshoro

Abstract

An 18-year-old male presented with a 1-day history of seizures, fever, and altered level of consciousness. The patient had no prior history of seizures but had experienced breathlessness on exertion and spells of cyanosis since childhood. On examination, the patient had a Glasgow Coma Scale (GCS) score of 8/15, a temperature of 102°F, and was actively having tonic-clonic seizures. Signs of meningeal irritation were absent. Neuroimaging revealed multiple brain abscesses, and an echocardiogram confirmed an underlying diagnosis of Tetralogy of Fallot (TOF). This case highlights the uncommon but significant complication of brain abscesses in patients with cyanotic congenital heart disease.

Keywords: Brain abscess, Tetralogy of Fallot, Seizures, Cyanosis, Congenital heart disease, Pediatric

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Corresponding Author: Dr. Shafaq Nazia Shaikh

Email: shafaq.shaikh@gmail.com

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Introduction

A brain abscess is defined as a localized area of tissue necrosis encased by a membrane within the brain parenchyma. The underlying source of infection may arise from nearby structures such as the ear, teeth and sinuses or from distant organs such as the heart.[1]

Brain abscesses are rare but serious complications in patients with congenital heart defects, particularly cyanotic congenital heart diseases (CCHD) such as Tetralogy of Fallot (TOF). TOF having nearly equal sex distribution is characterized by four defects: obstruction of the right ventricular outflow tract, enlargement of the right ventricle, ventricular septal defect, and aortic overriding.[2] The chronic hypoxemia and polycythemia associated with TOF can lead to brain abscess formation. We present the case of an 18-year-old male with undiagnosed TOF who developed multiple brain abscesses as the initial presentation of his condition. TOF is present in 5 to 18.7% of CCHD patients with cerebral abscesses.[3]

Case Presentation

An 18-year-old male was brought to the Emergency Department by his parents after experiencing tonic-clonic seizures affecting the left side of his body, fever, and altered level of consciousness for 1 day. This was preceded by headache for 5 days. There was no prior history of seizures, but the parents reported that the patient had episodes of breathlessness on exertion associated with blue discoloration of his finger tips and lips since childhood, which had not been evaluated previously. Additionally, there is history of poor growth. The family history is not significant.

Examination Findings

General Condition: The patient was semiconscious and actively seizing upon arrival.

- Cyanosis: present
- Clubbing: present

Vital Signs:

- Temperature: 102°F
- Heart rate: 110 beats per minute
- Respiratory rate: 24 breaths per minute
- Oxygen saturation: 65% on room air

Neurological Examination:

- GCS: 8/15 (E2, V2, M4)
- Seizures: Tonic-clonic movements on the left side
- Plantar reflexes: Left upgoing
- Pupils: Right dilated. Left constricted
- No signs of meningeal irritation

Cardiovascular Examination:

- Apex beat at left 5th intercostal space
- Right parasternal heave present

- Ejection systolic murmur noted at the left sternal border

Investigations:

1. CT Scan of the Brain: Multiple hypodense lesions in the frontoparietal areas on the right with midline shift.
2. MRI Brain Plain and Contrast: Multiple abnormal T2WI high signals noted in the frontoparietal region on the right with peripheral hypodense rim and marked perilesional vasogenic edema (Figure 1).
3. Echocardiogram: Large ventricular septal defect (VSD) with bidirectional shunt. Overriding of aorta. Right ventricular hypertrophy. Pulmonary stenosis. No vegetation (Figure 2)

Table 1: *Results of Blood Workup*

Hemoglobin	18.3 g/dl
MCV	107 fl
TLC	18.6 × 10^9/L
Neutrophils	85%
Serum Sodium	133 mmol/L
Serum Potassium	4.7 mmol/L
Serum Bicarbonate	16 mEq/L
SGPT	24 U/L
Creatinine	0.6 mg/dl
Urea	36 mg/dl
PT	14.9 sec
APTT	28 sec
MP ICT	Negative
Blood Culture	No growth seen after 5 days

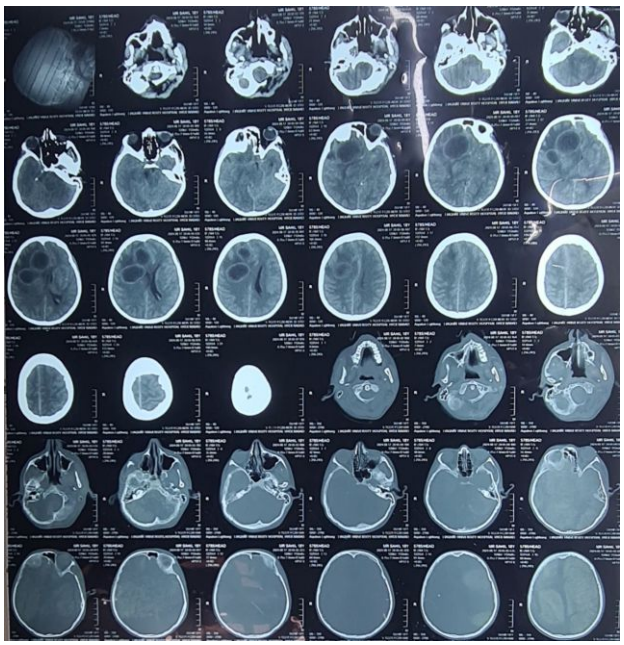

Figure 1: *MRI Brain showing brain abscesses*

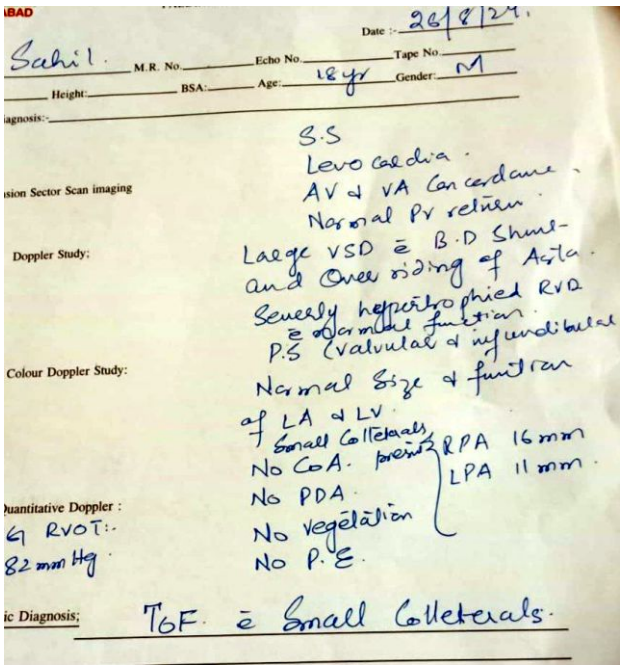

Figure 2: *Echocardiography report suggesting Tetralogy of Fallot (TOF)*

Diagnosis: The patient was diagnosed with brain abscesses secondary to uncorrected TOF.

Management: The patient was promptly treated with high flow oxygen and broad spectrum antibiotics. The cardiac and neurosurgery teams were immediately taken on board. Following this, the patient's condition started to improve.

Discussion

Tetralogy of Fallot (TOF) is the most prevalent congenital cyanotic heart disease, accounting for 5 to 7% of all congenital heart diseases.[4] It exhibits a nearly balanced distribution among both genders. It is characterized by four distinct anatomical abnormalities as follows; anteriorly misaligned Ventricular Septal Defect (VSD), overriding aorta, pulmonary stenosis and Right Ventricular Hypertrophy (RVH). Children born with TOF may be asymptomatic at birth or may present with several serious clinical features.[5] When these affected children reach infancy, they experience cyanosis which usually results in bouts of bluish discoloration evident on lips, tongue and fingertips. There are "Tet Spells" associated with cyanosis on feeding, crying or during bowel movements. During these episodes, the children experience difficulty breathing and may sometimes lose consciousness.[6] These clinical features are typically managed through a surgical procedure in early childhood.[6] A brain abscess is an uncommon but potentially fatal infection of the brain parenchyma that affects 5%–18.7% of people with congenital heart diseases.[7] In TOF, chronic hypoxemia results in an increased risk of brain abscesses due to right-to-left shunting. Additionally, the hyper-

viscosity, low immunity and reduced pulmonary filtration of bacteria and emboli also increase the risk of infection.[8] This case report is about an 18-year-old male who experienced symptoms such as episodic cyanosis, breathlessness and failure to thrive since early infancy. He did not seek formal medical attention regarding his symptoms until he recently experienced altered consciousness and seizures. The history, clinical examination and investigations revealed a previously undiagnosed Tetralogy of Fallot, complicated by multiple brain abscesses. This case underscores the importance of early recognition and management of cyanotic heart diseases, which can prevent such severe complications. The presentation of seizures and brain abscesses as the initial manifestation of TOF is uncommon but should prompt clinicians to investigate underlying cyanotic heart disease.

Conclusion:

This case highlights the need for prompt recognition and treatment of brain abscesses in patients with unrecognized or untreated cyanotic congenital heart disease, such as Tetralogy of Fallot. Early diagnosis and management of congenital heart defects may reduce the risk of such life-threatening complications.

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Authors' Contribution: Role and contribution of authors followed ICMJE recommendations

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