Case Report
Atypical multiple brain abscesses with congenital single ventricle: a case report

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Abstract: Multiple brain abscesses due to heart disease with congenital single ventricle is relatively rare in clinical practice. Herein, we reported a 28-year-old male patient with multiple brain abscesses who suffered from congenital heart disease (single ventricle). This patient was admitted due to 2-day headache and half-day body twitching without other symptoms. CT suggested intracranial hemorrhage. This patient developed fever after treatment. Then, enhanced magnetic resonance imaging (MRI) indicated spontaneous right frontal lobe hemorrhage, which suggested multiple brain abscess. After antibiotic treatment and brain abscess drainage, left hemiplegia was observed in this patient. The treatment for this patient was extremely risky and difficult due to the congenital heart disease. This patient was finally diagnosed with atypical multiple brain abscesses. Two operations have been conducted on this patient. Left limb muscle strength did not recover to normal level after treatment. This patient was followed up till Dec 2015.

Keywords: Congenital heart disease, atypical multiple brain abscess, cerebral hemorrhage

Introduction

Multiple brain abscesses are a rare and potentially life-threatening condition requiring early diagnosis and early treatment [1]. Congenital heart disease (CHD) is an important predisposing factor for hematogenous brain abscess, especially in children and adolescents with severe congenital heart disease [2-4]. It is reported that single brain abscess in children accounts for 69.49%, and multiple abscesses account for 30.5-42%. Multiple abscess is more common in children with cyanotic congenital heart disease [5, 6]. Herein, we reported a male adult with CHD suffering from multiple brain abscesses who was successfully treated in our hospital.

Case Report

A 28-year-old male patient visited our hospital due to sudden headache for 2 days and half-day body twitching. He was diagnosed with congenital single ventricle XXX years ago and thereafter received long-term oral metoprolol treatment. Cardiac ultrasonography indicated left ventricular hypertrophy, suggesting CHD (Figure 1).

Brain computed tomography (CT) and enhanced magnetic resonance imaging (MRI) revealed that the patient had spontaneous right frontal lobe hemorrhage secondary epilepsy. On the basis of findings from examinations after admission and the medical history, this patient was initially diagnosed with spontaneous right frontal lobe hemorrhage, CHD, and secondary epilepsy. Then, hemostasis, dehydration and other conservative treatments were administered. After 3-day treatment, the patient C-reactive protein (CRP) was 53 mg/L, white blood cell count was 10.16 × 10⁹/L, neutrophils accounted for 75.5%. Cranial CT found the tumor with subarachnoid hemorrhage (Figure 2). Then, anti-infective treatment was initiated with ceftazidime and the body temperature reduced to normal level. However, one week later, the headache deteriorated in this patient.

The subsequent cranial CT showed right space-occupying edema with subarachnoid hemorrhage in the parietal lobe (Figure 3). The man-
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Nitrol treatment was performed to reduce intracranial pressure, but the headache was not significantly improved.

After 12-days serial treatment, the symptom was not significantly improved, but the left limb paralysis was present, and muscle strength was graded 0. This patient was subsequently transferred into intensive care unit (ICU) for further treatment. Enhanced MRI revealed the right frontal lobe lesions and evident brain edema, and then brain abscess or cerebral glioma was considered (Figure 4). A second enhanced cranial CT also showed multiple brain abscesses in the right frontal lobe, which confirmed findings from MRI (Figure 5).

We speculated that CHD in this patient caused multiple brain abscesses. Meropenem and vancomycin hydrochloride was intravenously administered for anti-infective treatment. During the treatment, cranial CT and enhanced MRI revealed there was no change in the brain images.

Considering the risk for irreversible neurological impairment due to brain abscesses, immediate puncture and drainage of brain abscesses were done in this patient. 4 days later, the drainage tubes were removed. Unfortunately, the patient developed vomiting, his consciousness deteriorated significantly, the right pupil was 0.5 cm in diameter, and left pupil was 0.2 cm.

Figure 1. Cardiac ultrasonography suggests a single ventricle (arrow).

Figure 2. CT scan suggests intracranial hemorrhage, edema around the lesion (The high density in the image is the hemorrhage, the surrounding low density shadow is the edema zone) (arrow).

Figure 3. CT scan suggest that the absorbance of hemorrhage, and a cystic lesion at the site of hemorrhage (arrow).

Figure 4. Sagittal MRI suggests multiple intracranial cystic lesions (arrow).
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The emergent cranial CT indicated cerebral hernia and hematoma at the right frontal lobe (Figure 6). The patient received emergent craniotomy. After surgery, cefoperazone sulbactam, vancomycin, and diflucan were used for post-operative anti-infective treatment.

The symptoms were gradually improved after surgery, and the disease condition became stable after 79-day therapy. Examination on discharge showed right limb muscle strength of grade 5, left upper limb muscle strength of grade 3, left lower extremity muscle strength of grade 4, and negative bilateral babinski sign. This patient was followed up to Dec 2015. CT scan (Figure 7) was performed during follow-ups, and the latest CT showed that although there will be occasional seizures, and disease condition remained stable (Figure 7H).

Discussion

This report is a very rare case. Patients with single ventricle have a very short life cycle. Adult patients with single ventricle are rare. Through this case, we should pay more attention to such patients, avoiding missed diagnosis. Thus, doctors can make correct diagnosis and treatment plan as soon as possible. Intracranial hematoma and brain abscess can be treated by surgery. But early surgery may cause infection diffusion when abscess wall does not form completely. Therefore, it is important to diagnose correctly at the early stage when clinical symptoms and signs are not typical.

Brain abscess is a focal pyogenic infection of the brain parenchyma, and frontal-temporal lobe is the most common site of brain abscess, followed by frontal-parietal, partial, cerebellar, and occipital lobes. The major predisposing factors of brain abscess include contiguous infection, trauma, and hematogenous spread from a distant lesion [7, 8]. Brain abscess is a common complication of CHD [9]. The causes of CHD patients complicated with cerebral abscess may include: cerebral hypoxia, increased blood viscosity due to the compensatory erythrocyte increase. The diagnosis of brain abscess is usually based on clinical and imaging findings. Routine laboratory examination is not specific in the diagnosis of brain abscess [10, 11].

The treatments of brain abscess include pharmacotherapy and surgery. The medical treatment is mainly anti-infective treatment. Surgical treatment employs puncture and drainage of brain abscess. In recent years, some new methods are developed for the treatment of brain abscess, such as MRI assisted stereotactic puncture of multiple brain abscesses, minimally invasive puncture and drainage, cranial microsurgery [12-14]. Precise localization is a prerequisite for the surgical treatment of brain abscess [15, 16]. Invasive intracranial aspergil-
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Figure 7. CT scans during follow-ups. A. a CT scan at Dec 2010; B. a CT scan at Feb 2011; C. a CT scan at Apr 2011; D. a CT scan at Sep 2011; E. a CT scan at Apr 2012; F. a CT scan at May 2014; G. a CT scan at Sep 2015; H. 5 years later (Oct 2015), CT scan showed soft foci in the right hemisphere. The general condition is stable and intracranial pressure is normal. Arrows indicate the formation of soft foci.
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Loss is associated with high morbidity and mortality [17-19]. This is a significant improvement since 1960s in the treatment of brain abscess due to the development of imaging technique, better neurosurgery and use of antibiotics of higher generation.

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Disclosure of conflict of interest

None.

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References