

An Adult with Atrial Septal Defect Presenting with a Brain Abscess

Abstract

The common heart diseases resulting in a brain abscess are associated with a right to left shunt and include tetralogy of Fallot and transposition of great vessels. Atrial septal defect (ASD) is almost always associated with the left to right shunt and therefore is not a commonly considered risk factor for brain abscess. We report the case of a 29-year-old male, with no symptoms of cardiac disease, who presented with the left posterior frontal pyogenic abscess which led to the detection of a silent ASD. Our case emphasizes the need for a careful evaluation of the source of infection in patients with a brain abscess.

Keywords: *Atrial septal defect, brain abscess, bubble echocardiography*

Introduction

Patients with cyanotic heart disease with the right to left shunt are at the risk of developing brain abscess.^[1] The incidence of cardiogenic brain abscess is high, up to 46%, in children and adolescents, and is highest in the 4–7 year age group.^[2] Patients with atrial septal defects (ASDs) commonly have left to right shunt and hence are at a low risk for developing a brain abscess. Reports of ASD associated with a brain abscess are scarce. We report the case of a man presenting with a brain abscess in whom intensive investigation of the cause of clubbing and polycythemia led to the diagnosis of ASD.

Case Report

A 29-year-old man presented with a headache and insidious onset, progressive spastic right hemiparesis of 3 months' duration. He had no other comorbidities and had good effort tolerance. A contrast-enhanced computed tomography (CT) of the brain showed a ring-enhancing lesion in the left posterior frontal-subcortical location [Figure 1a]. He had been empirically treated with antituberculous therapy for 3 months and antibiotics for 2 weeks before his presentation to us. Despite these measures, there was a progressive worsening of his hemiparesis. Repeat contrast CT brain

showed an increase in the size of the lesion.

On examination, he was febrile and had grade 3 clubbing of the fingers of both hands. There was no cyanosis, and the respiratory and cardiovascular examination was normal. He had papilledema. There was right supranuclear facial paresis associated with spastic right hemiparesis with grade 2/5 power proximally and distally in the right upper and lower limbs.

Investigations revealed polycythemia with a packed cell volume of 50%. He underwent CT-guided stereotactic aspiration of the left frontal abscess [Figure 1b]. Blood culture did not grow any organism possibly due to the prior administration of antibiotics. Precordial echocardiogram showed no cardiac lesion. A transthoracic bubble echocardiography revealed the presence of an intracardiac shunt [Figure 2a]. The most common cause for an intracardiac shunt is a patent foramen ovale, but in this case, it turned out to be a small ASD, which was quite anteriorly located as shown in the picture. However, trans-esophageal echo did not show any vegetation in any of the valves. In all probability, this patient had septic emboli from the heart. Infective endocarditis in ASD is certainly a rarity but could very well be the reason for IE in this patient. CT thorax was negative for a pulmonary arteriovenous malformation.

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Histopathology was suggestive of a pyogenic abscess, and the cultures were sterile. He was treated with 2 weeks of intravenous crystalline penicillin, chloramphenicol, and metronidazole followed by 4 weeks of oral co-trimoxazole and rifampicin. There was an improvement in the right hemiparesis by one grade at the time of follow-up at 6 weeks. Contrast CT brain done 6 weeks postaspiration showed a reduction in the size of the abscess with a decrease in the mass effect and perilesional edema [Figure 1c]. He underwent an ASD closure after 6 weeks [Figure 2b].

Discussion

Brain abscess is defined as an intraparenchymal collection of pus that occurs due to direct inoculation of septic foci into the brain or by the hematogenous or contiguous spread of infection.^[1] The common causes of the brain abscess are chronic suppurative otitis media, congenital cyanotic heart disease, and paranasal sinusitis. As brain abscess presents with neurological deficits or raised intracranial pressure and is an emergency, management includes the treatment of the abscess followed by the source to prevent recurrence.

The most common cyanotic heart diseases associated with brain abscess are tetralogy of Fallot and transposition of great vessels.^[2] In patients with cyanotic heart disease with the right to left shunt, venous blood in the heart bypasses the pulmonary circulation, thus preventing the phagocytosis of the infective organisms by the pulmonary macrophages. These patients also have polycythemia that increases blood viscosity. The resultant hypo perfusion of areas in the brain and metabolic acidosis predisposes to seeding of the infective foci into areas of microinfarcts.^[1]

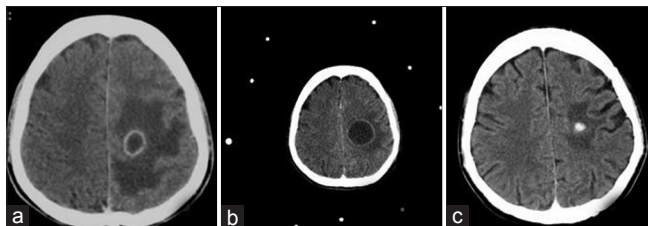


Figure 1: (a) Initial contrast computed tomography brain showing the left posterior frontal abscess. (b) Stereotactic contrast-enhanced computed tomography showing the left frontal subcortical ring enhancing lesion. (c) Contrast computed tomography brain six weeks after the aspiration reveals marked reduction in the size of the abscess and perilesional edema

In a patient with an ASD, a paradoxical embolus can cause a brain abscess.^[3] There are only four cases of brain abscesses reported in adults due to an ASD, details of which are summarized in Table 1.^[3-6] It may be noted that in the absence of the right to left shunt, none of the patients reported any complaints suggestive of a cardiac illness. Only two of the four patients (including our case) with the right to left shunt had symptoms or signs related to the same. Thus, careful clinical examination for ancillary signs such as clubbing in these patients, as was observed in our patient, could provide a clue to the source of the infection.

In our patient, the presence of clubbing and polycythemia provided a clue that the infection might have its origin in the heart or lung, associated with an otherwise silent right to left shunt. This high index of suspicion led to the patient being subjected to a transthoracic bubble echocardiography despite a normal precordial echocardiogram. This led to the diagnosis of the ASD associated with the right to left shunt. It is possible that our patient could have had a focus of infective endocarditis and vegetations was not visualized due to prior antibiotics.^[7] It was important to identify this cause as its treatment would prevent the recurrence of a brain abscess. ASD presenting with brain abscess in an adult is a rarity, and our case highlights the need for a careful evaluation for the source of infection of a brain abscess.

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Nil.

Conflicts of interest

There are no conflicts of interest.

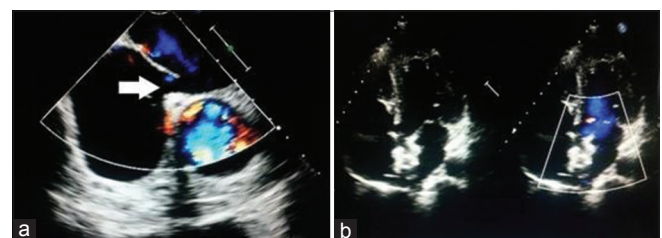


Figure 2: (a) Transthoracic bubble echocardiography revealing the intracardiac shunt. (b) Echocardiogram confirming the closure of the atrial septal defect

Table 1: Summary of reported cases of brain abscess secondary to an atrial septal defect in English literature

Author/Reference	Age/sex	Site of abscess	Cardiac shunt	Signs/symptoms of cardiac disease	Outcome
Dethy ^[2] (1995)	46/M	Fronto parietal	Bidirectional	No	Good
Chotmogkol ^[1] (1999)	59/M	Parieto occipital	Right to left	Yes	Good
Sung ^[7] (2010)	41/M	Frontal	Right to left	No	Good
Milli ^[4] (2010)	65/M	Occipital	Right to left	Yes	Good
Present case	29/M	Frontal	Right to left	No	Good

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