Case Report

A Child with Brain Abscess as a Complication of Tetralogy of Fallot with Infective Endocarditis: Outcome of Surgical Management

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Abstract
Brain abscess is a serious and life-threatening condition among children, with a sharp peak seen in those between 4 to 7 years of age. There have been recent improvements in diagnosis, treatment, and outcome though it is still a potentially fatal infection. No prospective clinical trials have compared the various surgical and medical treatment strategies available to guide the management of cerebral abscesses in children. Most surgical and medical treatment guidelines are based on populations consisting primarily of adult patients. The aim of this case study is to discuss the outcome of surgical management of brain abscess as a consequence of congenital cyanotic heart disease in a boy of 6 years age.

Introduction:
Cardiovascular disease is the main cause of mortality in all ages worldwide¹,². Tetralogy of Fallot (TOF) is the most common cyanotic congenital heart disease (CHD) accounting for 10%. TOF is often associated with neurological complications. Brain abscess is a serious complication in patients with uncorrected CHD mostly in the age of 4-7 years-old⁴. It is important to recognize brain abscess in patients with uncorrected CHD and manage accordingly.

Case Study:
Master Apon, a 6 years aged boy, was admitted in the pediatric ward of Sylhet MAG Osmani Medical College Hospital, Sylhet, Bangladesh, on 13/11/17 with the complaints of muscle wasting for 3 months, fever and unable to talk for 1 month and vomiting for 2 weeks. He was diagnosed as a case of Tetralogy of Fallot, 3 years ago. On general examination, he was ill looking, lethargic, polycytemic, GCS-9, pulse-119 beats per minute, temperature-101 degree Fahrenheit, cyanosed. Clubbing of the nails was also present. CVS examination revealed ejection systolic murmur in the pulmonary area. Important investigation findings were:

1. Chest X-ray: Boot shaped heart shadow with an upturned apex and concavity at pulmonary conus.
2. CT Scan of brain: A multiloculated area of Brain Abscess in the left parietal region with midline shifting.
3. Echocardiogram: TOF and vegetation like structure along VSD margin and tricuspid septal leaflet and
4. Blood culture: Blood culture report from 3 blood samples revealed growth of Staphylococcus aureus, which was sensitive to Imipenem/Meropenem, Linezolid, Azithromycin and Teicoplanin.

As he was non-responsive to antibiotic treatment, pediatricians referred him to the Neurosurgery department of the same hospital on 30/11/17. Expert opinion from cardiologist was taken regarding the risk of perioperative cardiac event. However, the per-operative period was uneventful with smooth recovery from general anesthesia. At operation, a large abscess
capsule and around 50 ml of pus was evacuated from right parietal region. Pus was sent for culture sensitivity, which revealed no growth. Double antibiotic therapy with meropenem and cloxacillin was administered intravenously for next 3 weeks. He made a good post-operative recovery with ability to talk and reduced vomiting tendency. Later, he was referred to National Institute of Cardiovascular Disease, Dhaka, for further management of TOF. At the day of
discourage, the patient was well and no focal deficit was observed.

**Discussion:**

Brain abscess is a focal, intra-cerebral infection that begins as a localized lesion and ultimately develops into a collection of pus surrounded by a well-vascularized capsule. Common causes are hematogenous spread from a distant organ (particularly in people with cyanotic congenital heart disease), infection from adjacent structures (e.g., otitis media, dental infection, mastoiditis, sinusitis), penetrating injury or comminuted fracture of the skull, intracranial surgery, congenital lesions of the head and neck, abnormalities of immune system and rarely, following meningitis. In about 15% of cases the cause remains unknown.

Brain abscess is a rare complication of cyanotic congenital heart disease. In one study, the frequency of brain abscess in people with cyanotic congenital heart disease was 2% among 1,270 patients during a 13-year period. The peak incidence occurs when the patient is between 4 years and 7 years of age, although cases of brain abscess may occur in adults with cyanotic congenital heart disease.

Several factors influence the evolution of brain abscess in cyanotic heart disease. The two most important factors are polycythemia and hypoxia. In cyanotic heart disease, there is increased viscosity of blood resulting from compensatory polycythemia and the reduced rate of flow in the microcirculation of the brain which causes an infarct by intravascular thrombosis. In addition, diminished oxygen tension or brain hypoxia may facilitate the arrival of shunted blood containing virulent organisms followed by focal cerebritis. The parietal (28%), frontal (25%) & temporal (23%) lobes are the most common sites for brain abscess. Clinically, patients usually present with vomiting, fever, headache, seizures, focal neurological signs & eventually papilloedema & coma, but these manifestations may be subtle at the initial stage. Optimal therapy involves a combination of high dose parenteral antibiotic & drainage of abscess. High doses of IV penicillin G & chloramphenicol are used to treat brain abscess with congenital cyanotic heart disease. Alternatively, Metronidazole can be used in combination with 3rd generation cephalosporin or penicillin G. Surgical correction of brain abscess comprises osteoplastic craniotomy with removal of abscess capsule or aspiration & drainage of the abscess under stereotactic guidance. This procedure can also be made by general or scalp block anaesthesia with good results but requires expensive apparatus & expert anesthetist.

**Conclusion:**

This case study clearly shows the reflection of the fact that in any patient with congenital cyanotic heart disease, the development of focal neurologic abnormalities or evidence of increased intracranial pressure must be considered as indicative of the possible presence of a brain abscess until proven otherwise. Surgical correction plays a crucial role in management of brain abscess with better outcome, particularly if the whole capsule is removed.

**References:**