



MULTIPLE BRAIN ABSCESES IN A YOUNG INFANT WITH NO APPARENT RISK FACTORS

Paediatrics

Jayashree Nadkarni*

Professor, Department of Paediatrics, Gandhi Medical College and affiliated Kamla Nehru, Hamidia and SZ Hospitals, Bhopal (M.P.) India *Corresponding Author

Debashish Biswas

Resident for MD, Department of Paediatrics, Gandhi Medical College and affiliated Kamla Nehru, Hamidia and SZ Hospitals, Bhopal (M.P.) India

ABSTRACT

One of the most common predisposing factors for brain abscess in childhood is cyanotic congenital heart disease with right to left shunt. Here, we present a case of a 6 months old male child who was admitted with complains of fever, increasing head size and one episode of abnormal movements of all 4 limbs. The patient was initially suspected to have hydrocephalus but eventually diagnosed as brain abscess without any underlying congenital cyanotic heart diseases.

KEYWORDS

Brain Abscess, infant, Cyanotic Congenital Heart Disease, communicating hydrocephalus, staphylococcus aureus, cerebritis

INTRODUCTION

Brain abscess is an intracranial encapsulated purulence and inflammation in one or more region of brain parenchyma with polymicrobial etiology and having high mortality and morbidity. Within brain parenchyma, it begins as a localized area of cerebritis that evolves into a collection of pus within a very well-vascularized capsule [1]. Brain abscess can occur in children of any age group mostly between ages of 4-8 years and in neonates. Hospital based studies from India report an average incidence of 8-15 cases/year. Brain abscesses account for 8% of intracranial masses in developing countries and 1-2% in developed countries. Paediatric cases constitute almost 25-42% of all brain abscesses. Most brain abscesses are single but 30% are multiple and may involve more than one lobe [2]. Brain abscess may cause compression, herniation, destruction and infarction resulting in neurological impairment according to the degree and specific involvement of cerebral region [1]. Early diagnosis using radiological modalities like computed tomography (CT), magnetic resonance imaging (MRI) with judicious administration of broad spectrum antibiotics/antifungals with prompt and aggressive neurosurgical interventions are the key steps in management of brain abscess [3].

CASE REPORT

A 6 month old male child, presented in our institution with complaints of fever for 3 months, increasing head size for 10 -12 days, and one episode of abnormal movements of all 4 limbs. The child was the first issue of a non consanguineous marriage. He was an institutional vaginal delivery born at full term, with birth weight of 2.6 Kg and cried immediately after birth. The child was immunized till date. There was no history of maternal fever, rashes, per vaginal discharge or bleeding during antenatal period. Family history was not significant. Clinical examination revealed heart rate 132/min, respiratory rate 40/min, temperature of 101.0 F and SpO2 98% at room air. Anterior fontanelle was bulging and pulsatile and head circumference was 47 cm that falls at +3SD. Patient was irritable with normal tone in all 4 limbs, power was grade 4, had extensor planter reflexes and absent deep tendon reflexes and there was no signs of meningeal irritation. Other general and systemic examinations were within normal limits.

Empirical treatment was started with intravenous antibiotics (ceftriaxone, vancomycin and metronidazole), anticonvulsants, diuretics and supportive measures. Complete blood test, liver function tests, renal function tests, PT/APTT/INR, serum electrolytes, were within normal limits. MRI brain was carried out to make definitive diagnosis and it showed multiple brain abscesses in left cerebrum, largest measuring 5.2 by 2.9 cm leading to mass effect with midline shift approximately 10.2 mm towards right side and moderate obstructive hydrocephalus (Fig 1). Chest radiography, HIV serology of father and mother was normal. No papilledema was detected on fundus examination. 2D Echocardiography ruled out any underlying congenital heart diseases. Lumbar puncture was avoided in this case to avoid risk of sudden herniation and collapse.

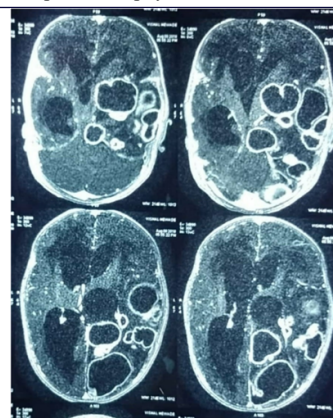


Figure 1: MRI Brain showing encapsulated multiple brain abscesses with midline shift

Neurosurgery opinion was sought. Management was planned for aspiration of brain abscess on multiple sittings under general anaesthesia. After relevant investigations and anaesthetic fitness, patient was posted for surgery. Abscesses were drained. Pus culture of aspirated brain abscess showed staphylococcal growth with colony count >100000 CFU/ml. IV Vancomycin and metronidazole were continued and Cefazidime was substituted in place of Ceftriaxone based on culture and sensitivity report. Post-operative CT scan showed much improvement and only 2 small abscesses were now seen (Fig 2). Patient was advised to continue antibiotics for another two weeks and to review with repeat CT scan of brain after 15 days. On follow up child was normal without any neurological deficit.

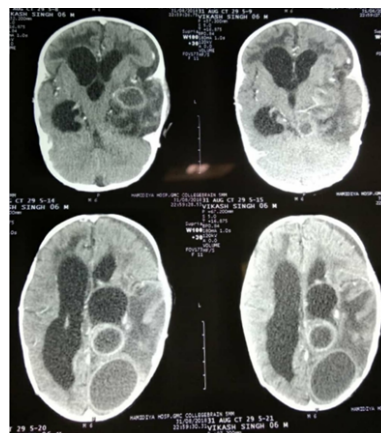


Figure 2: Post-operative MRI Brain showing only two abscesses.

DISCUSSION

A brain abscess is a localised area of infected and inflamed brain parenchyma, evolving through various stages into an encapsulated collection of purulent material. Paediatric abscess are supratentorial in 85%, infratentorial in 13% and combined in 2% cases [2].

The most common age group is 4-8 years and neonates [2]. In our case, the child was 6 months old.

There are 4 stages of abscess formation, early cerebritis (1-3 days), late cerebritis (4-9) days, early capsulation (10-14 days) and late capsulation (>14 days) [1].

Risk factors include compromised immune system as in HIV/AIDS, cancers/chronic illness, congenital heart diseases with right to left shunt, comminuted skull fractures, neurosurgical procedures such as VP shunt implantations, immunosuppressive drugs used in chemotherapy etc [2].

The most common predisposing factors for brain abscess in childhood is cyanotic congenital heart diseases. The incidence of brain abscess in this group is approximately 2%. Unoperated cases account for 25-46% of brain abscess cases in children [1]. Approximately 80% of patients with brain abscess have a known predisposing factor while remaining 20% are cryptogenic [4].

Brain abscess is caused by contiguous spread (25-50%) which is usually single and involves spread of infection from pericranial non neural contiguous focus like paranasal sinuses, middle ear cavity, dental caries or inflamed meninges as a complication of meningitis. The hematogenous spread (15-30%) is usually multiple and involves spread from distant focus such as congenital heart disease (CHD), bacterial endocarditis, empyema, skin and intra abdomen. Can occur also due to direct inoculation (8-15%) secondary to compound skull fractures, scalp wounds anterior cranial fossa or temporal bone fractures, and neuro surgical procedures [1].

The predominant organisms causing brain abscesses in children are both anaerobic and aerobic. Streptococci (60-70% of the cases) with *Streptococcus milleri* group (*Streptococcus anginosus*, *Streptococcus constellatus*, and *Streptococcus intermedius*) are being increasingly isolated from surgically drained brain abscesses. Other important streptococci include group A and B streptococci, *Streptococcus pneumoniae*, and *Enterococcus faecalis*. Other bacteria isolated from brain abscesses include Gram-positive cocci, anaerobes (*Bacteroides* spp., *Fusobacterium* spp., *Prevotella* spp etc) *Actinomyces* spp. and Gram-negative aerobic bacilli (*Haemophilus aphrophilus*, *Haemophilus parainfluenzae*, *Haemophilus influenzae*, *Enterobacter*, *Escherichia coli*, *Proteus* species) [2]. Although *Proteus* and *Citrobacter* are common pathogens for brain abscess in western literature, there are no such reports from Indian continent [5]. *Klebsiella pneumoniae* is one of the common organisms, causing neonatal sepsis in India [6]. Untreated meningitis can lead to complications like brain abscess. Renier et al. reported *Proteus* to be the commonest organism. The likely cause for this could be population differences in colonizations, genetic differences in immune responses, and possibly geographical differences in laboratory techniques for pathogen isolation and reporting [7][8].

Signs and symptoms includes fever (60-80%), headache (50-80%), vomiting (20-70%), seizures (20-25%), altered mental status, confusion, drowsiness, irritability, inattention, decreased responsiveness and movements, gait ataxia, aphasia, loss of co-ordinations, muscle functions, visual impairments, coma etc [1]. The clinical features may vary according to the specific lobe involved such as personality changes, drowsiness, seizure, appearance of primitive reflexes, hemiparesis may be seen in frontal lobe involvement. Inferior quadrantanopia / homonymous hemianopia, dysphasias, dyspraxia, spatial neglect in parietal lobe involvement. Dysphasias, superior quadrantanopsia in temporal lobe involvement. Rupture into ventricles can cause ventriculitis / ependymitis, septic thrombophlebitis of transverse sinus in occipital lobe involvement. Cerebellar involvement causes appendicular and gait ataxias, and abnormal ocular movement, loss of co-ordination. If the brainstem is involved then obstructive hydrocephalous, multiple cranial nerve palsies are seen [1].

MRI Brain with gadolinium is the imaging modality of choice for diagnosing brain abscess. It is superior to computed tomography (CT) scan in identifying early stages of cerebritis, microabscesses, brain

stem and cerebellar pus collection. On MRI Brain on T1 weighted images, brain abscess appears as a hypointense lesion with ring enhancement on gadolinium administration. On T2 weighted images it appears as a central hyperintense lesion encircled by a uniform hypointense capsule and surrounded by an irregular hyperintense area of perilesional edema [1].

Treatment of choice is mainly third generation cephalosporins, vancomycin and metronidazole. The duration of antibiotic therapy depends on the organism and response to treatment which usually is for 4-6 weeks [2]. Empirical therapy should be avoided in immunocompromised patients and every efforts should be made in establishing a microbiological diagnosis [1]. Raised intracranial pressure is often seen and treatment must be directed to its symptomatic management. The role of corticosteroids in treatment of brain abscess is controversial. Studies have shown that steroids inhibit capsule formation, interfere with inflammatory response, increase risk of ventricular rupture and alter CT findings. They are however indicated in children with signs of impending herniation secondary to mass effect caused by massive perilesional edema [1]. Seizures can be the initial manifestation of brain abscess in upto 25-43% of cases [9]. Antiepileptics are required for children who develop seizures for 1-4 months [1]. The duration should be individualised and guided by EEG studies in the follow up phase of disease. Most authors recommend providing at least 3 months of prophylaxis if no more seizures have occurred [10].

A repeat CECT should be done urgently in case of sudden neurological deterioration. Else, it is to be repeated after 2-4 weeks of initiation of medical therapy to document the change in size of abscess and resolution [1].

Surgery is needed if the abscess is >2.5cm in diameter, increasing abscess sizes after 2 weeks of antibiotic therapy, no decrease in abscess sizes after 3-4 weeks of antibiotics, presence of gas in the abscess, multiloculated abscess, traumatic abscess with bone chips or foreign materials, fungal brain abscess or lesion located in the posterior fossa [1].

Mortality rates prior to 1980s ranged from 11-53%. More recent mortality rates accompanying wider use of CT and MRI, improved microbiologic techniques and prompt antibiotic and surgical management, range from 5-10% [2]. Prognosis is very poor in neonatal/infantile age group, rapidly progressive symptomatology, low glasgow coma score, rupture in ventricles, posterior fossa location, multiloculated abscess, immunocompromised state, fungal abscess [1].

As per various studies, about 60% of children may have neurological and developmental sequelae [11] [12]. The commonest problems reported are hemiparesis, seizures, visual field defects, and learning difficulties [12][13].

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