ISSN 1220-8841 (Print)
ISSN 2344-4959 (Online)

ROMANIAN
NEUROSURGERY

Vol. XXXV | No. 2 June 2021

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DOI: 10.33962/roneuro-2021-031

Romanian Neurosurgery (2021) XXXV (2): pp. 199-203
DOI: 10.33962/roneuro-2021-031
www.journals.lapub.co.uk/index.php/roneurosurgery

Paediatric brain abscesses in tribal region of India. A single centre experience

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ABSTRACT

Introduction: Brain parenchymal abscesses are relatively infrequent but potentially serious infections in the paediatric population. Surgical intervention in addition to a prolonged administration of antibiotics is generally appropriate management.

Aims and objective: We performed this study to assess the clinical profile, aetiology and outcome of paediatric brain abscess which are treated surgically only by aspiration in the tribal region of Rajasthan.

Material and method: A single-centre retrospective study was conducted over a 5 year period (2014–2019) in the department of neurosurgery in RNT medical college, Udaipur, Rajasthan. We treated approx. 60 patients of which 25 patients treated conservatively and 5 patient treated by craniotomy and abscess excision. So only 30 patient included in our study in which abscess treated by aspiration only. Patients<18 years of age with a confirmed intra-parenchymal abscess were included. Patient records were reviewed for abscess location, microbiology results, Clinical features, Surgical intervention, and outcome using the Glasgow Outcome Score at 3 months.

Result: 11 patients had an abscess in the temporal lobe and Streptococcus was the most common causative micro-organism (n¼15). 25 patients (80%) had an identifiable source which included: ENT infections, congenital cardiac malformations, recent dental surgery and meningitis. The most common symptom is fever f/b headache, seizure and vomiting. But despite previous studies seizure (10/30) presentation is comparatively more. All 30 patients underwent aspiration.

Conclusion: In tribal regions of India ENT infections are a more common source of brain abscess because of poor hygiene and illiteracy and their ignorance of ENT infections and also not taking seriously to fever, headache and other health issues. But at present, there are also decreasing trends of brain abscess by ENT infections and rising trends by congenital heart disease which is a good sign that the health and educational infrastructure is strengthening in the tribal region also.

Keywords
abscess, aspiration, paediatrics, ENT

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ISSN online 2344-4959
© Romanian Society of Neurosurgery

First published
June 2021 by
London Academic Publishing
www.lapub.co.uk

INTRODUCTION

A brain abscess is an intra-parenchymal collection of pus in the brain. The incidence of brain abscess among intracranial masses varies from 1-2% in western countries, to about 8% in developing countries[1]. It is still a life threatening and fatal entity and often leads to serious disability and even death if misdiagnosed or treated improperly[2]. Brain abscesses are relatively less common in the paediatric population compared to adults; however, they remain a serious, life-threatening infection[3].

The causes of brain abscesses are highly variable in children. The major predisposing conditions in children are: an adjacent focus of infection, trauma, haematogenous seeding, neurosurgical procedures, cyanotic heart disease and immunocompromised states[4,5,6]. Associated sites of infection commonly include sinusitis, mastoiditis, dental infections and chronic otitis media where aerobic bacterial infections such as Streptococci and Staphylococci predominate[4,7]

The gold standard treatment of brain abscesses continues to be aspiration or excision combined with antibiotic therapy.[5] However the outcome has improved dramatically in recent decades due to improvements in diagnostic techniques and broad-spectrum antibiotics[8.] Magnetic Resonance Imaging is more sensitive at diagnosing early cerebritis[9] and has increased the prognosis of brain abscess by improving the speed of diagnosis.

Despite all of these advances abscesses are still a significant cause of morbidity and mortality[10]. In addition, abscess growth can result in rupture of the abscess into the ventricular system. This life-threatening event will result in an acute decompensation and symptoms of a purulent meningitis[11].

We performed this study to assess the clinical profile, aetiology, and outcome of paediatric brain abscess in the tribal region of Rajasthan.

Material and method

A single-centre retrospective study was conducted over a 5-year period (2014–2019) in department of neurosurgery in RNT medical college, Udaipur, Rajasthan. We treated approx. 60 patients in which 25 patients treated conservatively and 5 patients treated by craniotomy and abscess excision. So only 30 patients included in our study in which abscess treated by aspiration only.

The final cohort of 30 patients comprised 20 male patients (45.8%) and 10 female patient and had a mean age of 6.5 ± 4 years Patients < 18 years of age with radiological confirmed intra-parenchymal abscess were included. Patient records were reviewed for abscess aetiology, location, size, microbiology results, surgical intervention, and outcome using the Glasgow Outcome Score at 3 months.

We include the patients in which abscess treated only by aspiration and then antibiotics. Aspiration of abscess may be single or multiple times. Size of abscess is more than 2.5 cm. The total antibiotic duration was discernible from the medical notes for all patients and the mean time was 5.8 ± 2.0weeks. This comprised a mean of 2.9 ± 1.5 weeks intravenous and3.0 ± 1.8 weeks oral antibiotics. White cell count >11109/L and/or C-Reactive Protein >5mg/L was classed as raised inflammatory markers. Functional outcome was measured using the Glasgow Outcome Score (GOS) at 3 months from discharge. Those with isolated subdural empyema, extradural abscess, or an unknown abscess location were excluded from the study.

Result

Most common symptom is fever followed by headache, seizure and vomitting. (Table-3). The classic triad of headache, fever and focal neurological deficit was seen in two patients (8.6%). Drowsiness or reduced level of consciousness on presentation was recorded in 6 patients (34.8%). Age of patients are mostly 5-10 years. (Table-1)

The Temporal lobe was the most common abscess location (11). The remainder of the abscesses were in the parietal lobe (8), frontal lobe (7), cerebellum (2), thalamus (1), pons (1) (Table 4) .22 patients had a solitary lesion at presentation and rest 8 has more than one lesion. The patient with aspergilloma had two lesions in the same location.

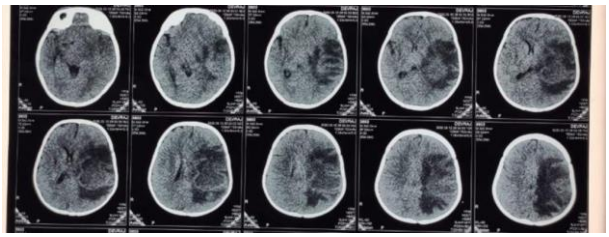

Figure 1. Pre-operative scan of 10-month male child left temporo-parietal brain abcess (original pics).

S. N.	Age	Number	Percentage
1	<5 year	6	20%
2	5-10 yr	15	50%
3	10-18 yr	9	30%

Table 1.

25 patients (80 %) had an identifiable source which include post meningitic (4), congenital cardiac malformations (7), Otogenic and mastoditis (11), Post

traumatic (3). Rest 5 has other non-identifiable sources (Table-2). Streptococcus was the most common organism cultured from the abscesses (18). Other microorganisms include Staphylococcus aureus (5), Coliforms (1), Propriobacterium (1), Mycobacterium tuberculosis (2), Gram negative rods (1) and mixed anaerobes (2).

All 30 patients underwent surgery. All 30 patients had Burr hole aspirations (Figure 1 and 2) (17 patients had single aspiration). More than 2.5 cm size of abscess aspirated or treated surgically, rest were treated conservatively. Pre-operative imaging was available for all 30 patients and volumetric analysis showed an average pre-operative volume of 16.3ml.

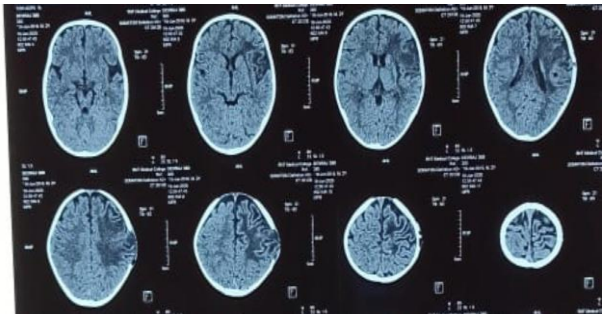

Figure 2. Post-operative scan of this 10-month male child after single burr hole aspiration (original pics).

S. N.	Predisposing Factor	No.	Percentage
1	Otitis Media and mastoditis	11	36.66%
2	Congenital heart disease	7	23.33%
3	Meningitis	4	13.33%
4	Posttraumatic	3	10%
5	Others	5	16.66%

Table 2.

According to size 2.5- 3.5 cm total 16 cases in which 4 cases require single re aspiration (28.57%) , but in 3.5-4.5 cm size total 10 cases in which we require 6 re aspiration (60%) , in which 4 cases require single reaspiration and 2 require two reaspiration. More than 4.5 cm total 4 cases in which 3 patients requires re aspiration. (75%), in which 1 case require two re aspiration and rest 2 cases required three re-aspiration (Figure-3). But the good thing is that all treated with aspiration and antibiotics. Location dose not significantly co-relate with re –aspiration.

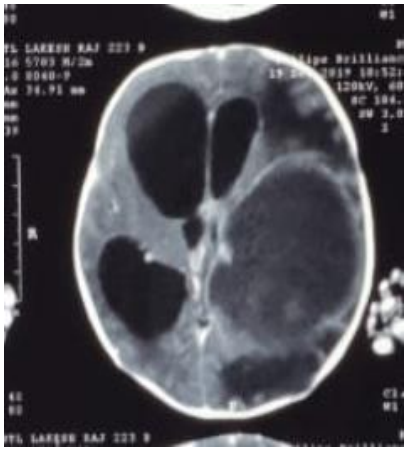

Figure 3. Huge abscess in left temporoparietal region in 2.5month old child (Original Pics).

GOS score at 3-month -22 patient has 5, 3 patients has score 4 and 3 patient had score 3 or less. 2 patients expired – 1 due to some cardiac problem in congenital heart disease, second is due to severe sepsis in otitis media patient. Rest 28 patients survived.

According to symptoms fever resolved in all patients. Seizure resolved in 6/8 patients in 3 months follow up. Motor deficit corrected in 6/8 patients in 3 months follow up.

S.N.	Symptoms and Signs	Number	Percentage
1	Fever	14	46.66%
2	Headache	11	36.66%
3	Seizure	10	33.33%
4	Altered Sensorium	6	20%
5	Vomitting	5	16.66%
6	Meningism	5	16.66%
7	Motor deficit	8	26.66%
8	Sensory deficit	4	13.33%

Table 3.

S.N.	Site of abscess	Number	Percentage
1	Temporal	11	36.66%
2	Frontal	7	23.33%
3	Parietal	8	26.66%
4	Cerebellum	2	6.66%
5	Others(pons,thalamus)	2	6.66%

Table 4.

Discussion

The change in practice towards early prescription of antibiotics for oto-sinogenic infections has resulted in a change in the infective etiologies associated with brain abscess[12]. In studies from the pre-CT era ENT infections were the cause in 38-76% of brain abscesses in children; however this has fallen to 8-36% .In the modern era with congenital heart disease and immunosuppression becoming a more commonly recognized causative factor[11,12,13,14].But in the present study, Temporal lobe abscess following middle ear infection and mastoiditis was the commonest finding[15,16]. Temporal lobe abscess following otogenic infection has been found in previous studies[22]. In tribal area due to poor hygine and others late responding to fever and ignorance of ear infection or maltreatment of ear infection develop a simple meningitis and ear infection into a brain abscess[15,16].

In our study, males are more affected than females. Males are more exposed to outdoor activities with greater chance of ear infection and predisposing to brain abscess [17]. Regardless of the changes in etiology, Streptococcus remains the most commonly reported causative microbe both in this series and those published in the literature[17,18]. The presentation of brain abscesses is non-specific but most commonly includes, headache, fever, altered mental status, meningism and seizures[5,]According to Samull et al nowadays suggest that headache and fever is the most common symptoms and seizures is not so common in abscess but in this study seizure is also common complain (10/30-30%) because involvement of temporal lobe is more .

Those who present with altered mental status and rapid neurological deterioration are more likely to have an increased mortality rate[19]. 2 patient expired in this study had low GCS and altered mental status. So preoperative GCS is important for prognosis. Multiple aspirations were associated with a larger initial abscess volume. These will leave a larger cavity that is slower to involute and thus leave a nidus of infection that can re-accumulate. Half of the patients in this series required more than one aspiration and thus patients should be counselled accordingly.[12]

Modern series report lower mortality rates than the pre-CT era ranging from 8 to 25%[20] and the large series by Tekkok and Erbengi[21] even managed 0% mortality at the end of their study period. Neuroimaging was done in all cases. CT scan was done in 25 cases and MRI was done 5 cases. The only added advantages of MRI over CT Scan are: better differentiation of edema from necrosis, more sensitivity in detection of early cerebritis, greater sensitivity for early satellite lesion[23.] Most common neuroimaging finding was ring enhancing lesion. This has been reported in previous studies from India and abroad[24,25].

One reason for a low mortality rate may be an aggressive approach towards abscess drainage and also sepsis source control. Poor Glasgow coma scale (GCS) at time presentation has been associated with poor outcome. Previous studies in India, Nepal and Pakistan have also reported poor GCS as negative prognostic factor in their studies[24,25]

Conclusion

This study demonstrates that in the modern era with ready access to CT imaging and broad-spectrum antibiotics, low rates of morbidity and mortality can be achieved. Drainage of paediatric abscesses remain the mainstay of treatment both to relieve mass effect and provide a microbiological diagnosis. Patients and their families should be counselled to expect multiple procedures.

But in this study most common predisposing factor for abscess is otitis media than congenital heart disease. Because in tribal region exposed to outdoor activities with greater chance of ear infection and predisposing to brain abscess. Also, illiteracy and poor hygiene leads to more chances of chronic ear discharge and brain abscess formation in future.

So we need to educate the people of tribal region for proper hygine and also early consult to doctor for any ear infection. We have to educate them about their proper health checkup and consult if child had fever, seizure, headache and vomitting. If infant and less than 3 yr age child had excessive irritability then also take consultation. We can also promote pneumococcal vaccination.

But at present there are also decreasing trends of brain abscess by ENT infections (11/30 -36.66%) and rising trends by congenital heart disease (7/30-23.33%) which is a good sign that the health and educational infrastructure is strengthening in tribal region also.

Conflict of interest

There is no conflict of interest to disclose.

Informed Consent

Informed consent was obtained from all individual participants included in this study.

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