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A STUDY OF CLINICAL FEATURES AND SURGICAL OUTCOME OF INTRACRANIAL ABSCESS: A CASE SERIES STUDY

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ABSTRACT
Objectives to study the clinical profile and radiological profile of patients with intracranial abscess and to study the current surgical options and outcome. A case series study of twenty two patients with intracranial abscess was studied. Among the selected patients the socio-demographic profile, clinical profile and the surgical interventions undertaken and the outcome were noted. Appropriate descriptive statistics were used to analyse the findings and to draw the inferences. There were 14 males and 8 females. The mean age of presentation was 19.8 ± 9.7 years (range being from 5 years to 35 years). The duration of illness at the time of admission was 32.7±13.5 days (range 15 days to 60 days). Typically patients presented with fever, vomiting, headache and seizures. The predisposing conditions found were CSOM 16 (72.7%) and paranasal sinusitis 8 (36.2%). Computerized tomography confirmed the diagnosis and the most of the intracranial abscess were supratentorial 18 (81.8%), solitary 19 (86.4%) and intracerebral 13(59%) and the common location of the abscess was the temporal lobe of the cerebral hemisphere. All abscesses more than 2 cm in diameter were aspirated surgically. Secondary excision was performed in 11 patients and primary excision was done in 7 patients and 2 patients were treated conservatively. Complications were seen in 4 patients. Brain abscess is a serious infection which must be diagnosed early and treated aggressively. Management of intracranial abscess should be individualized depending upon the various important factors like age of the patient, the level of consciousness at the time of admission, multiplicity of abscesses, the nature of the infection and plane and level of the abscess.

INTRODUCTION

Brain abscess is a focal infection, which begins when organisms are inoculated into the brain parenchyma, usually from a site distant from the central nervous system (CNS). Abscess formation occurs through several stages. Inflammation during the "early cerebritis" stage evolves into a necrotic collection of pus, eventually surrounded by a well-vascularized capsule after 2 weeks [1,2]. Although rare in developed countries, brain abscess is a serious, life-threatening emergency. Once having a dire outcome, morbidity and mortality have decreased because of advances in diagnostic modalities, antibiotic regimens, and earlier surgical interventions [3,4]. However, changes in epidemiology, including new disease pathogens and predisposing factors, have renewed concern about the diagnosis and treatment of this condition. The incidence of brain abscess varies from 8-10% of all intracranial space occupying lesions in the developing countries reported by Osenbach, Loftus [5] and Sharma [6]. Intracranial abscess is still a significant health-care problem in developing countries [7,8,9]. Though potentially curable, brain abscess remains a diagnostic and therapeutic challenge [6]. The post CT scan era there are major advances in the diagnosis and management of brain abscesses, with a corresponding improvement in the survival rate in developed countries [6]. With the advancement in technology and development of stereotactic endoscopic technique in the treatment of

brain abscess the mortality and morbidity are very low [11,12]. But these facilities are far from the reach in poor and developing countries and the mortality and morbidity is still high in under developed countries. Most of the reports from India are from later half of the 20th century [9,13,14,15]. These reports mainly deal with the bacteriology of brain abscesses. In some, the demography also has been discussed. The aim of this study was to analyse the clinical features and surgical outcome of brain abscesses. The data were then compared with the available literature.

METHODOLOGY

A case series study of twenty two patients with intracranial abscess was studied. This study was done in the hospital setting in patients with intracranial abscess coming to Neurosurgery Department at Vijayanagara Institute of Medical Sciences, Bellary, from April 2013 to March 2015. Ethical approval for the study was obtained from the Vijayanagara Institute of Medical College Ethical Review Committee (ERC). Departmental clearances were obtained and informed consent of the patient's immediate relatives was obtained. Among the selected patients the socio-demographic profile, clinical profile, radiological profile and the surgical interventions undertaken and the outcome were noted. CT scan confirmed diagnosed cases of intracranial abscess irrespective of their age and sex were included in the study and those cases who had a fungal, amoebic or tuberculosis brain abscess and patients who got discharged against medical advice were excluded from the study. Statistical analysis was performed using SPSS version 17. Appropriate descriptive statistics were used to analyse the findings and to draw the inferences. Statistical tests of significance, like chi-square (with corrections) were used wherever required.

RESULTS

A little more than 50% of the cases were in the age group of 21-30 years, the mean age of occurrence of intracranial abscess was 19.8 ± 9.7 years (range being from 5 years to 35 years). A preponderance of males over females (3.5:2) was found amongst the patients . Majority of the cases were from Hindu religion (81.8%) and most of the cases were hailing from rural areas (63%) with a low socio-economic status (77.3%). About half of the cases were daily wage workers. The mean duration of illness at the time of presentation was 35.2 ±14.5 days (range 17 days to 60 days). The predominant symptoms of the cases were headache (100%), vomiting (81%) followed by fever (86%). However the classical triad of brain abscess headache, fever and focal neurological deficit was seen in only two cases. Papillary edema was seen in 15 patients suggesting raised intracranial pressure and seizures was present in 6 patients. Apart from these common symptoms there were some uncommon symptoms like proptosis was observed in 3 patients and ptosis was seen in one patient. Other symptoms included hydrocephalus and neck rigidity (Table 2, Fig 1). In this study, the period between the onset of symptoms and admission varied from 10 to 51 days with mean of 27±9.7 days which reflects the health seeking behaviour of the patients. Half of the patients had a GCS score of 9-12 indicating moderate brain injury and rest of the patients had mild brain injury with GCS score of more than 13. The presence of a predisposing factor precipitating the onset of brain abscess was found in 90% of the patients in the present study. Chronic suppurative otitis media (CSOM) (72 %) was found to be the most important source of intracranial suppuration followed by sinusitis (36%). One of the patient was diabetic (Type II) who had paranasal sinusitis with allergic rhinitis with invasive mucor mycosis and one of the 12 year old student had insulin dependent diabetes milletus.

Cerebral imaging was done by computerized tomography in all the cases. In 13 patients the plane of abscess location was intracerebral (59%) followed by epidural 7(31%) and subdural 2(9%). In 18(83%) of the patients the level of abscess location was supratentorial where abscess was present in the left side in 13 (59%) of the patients, on the right side in 2(9%) and bilateral in 3(13.6%). Majority of the patients had a solitary abscess (86%) and 3 patients had multiple abscesses (Fig 2, 3). The mean size of abscess was 3.57±1.12 centimetres in diameter where the smallest abscess was measuring 1cm and the largest abscess being 5.4 cms in diameter. Midline shift was seen in one patient. All patients with intracerebral abscess with a diameter of more than 2 cms were managed first by aspiration to reduce the mass effect and later secondary excision was done in case of recurrence. But in cases of intracranial epidural abscess and subdural abscess primary excision was done (Fig 4). However abscess less than 2 cms was managed conservatively using antiboitcs. Patients who were treated by excision had a better outcome without any recurrence and complication when compared to patients who underwent aspiration and conservative methods. One of the patients who was managed conservatively met with a complication of loss of vision who had also a space occupying lesion in the left orbit. However there was no statistically significant difference in the outcome of patient with respect to variables like age, sex, level of consciousness, surgical procedure done, abscess location and source of infection. Complications were common among patients who had coexisting space occupying lesion, large abscess (more than 5 cms) with a midline shift and uncontrolled diabetes. In our study one patient died and other complications like recurrence, transient upper motor neuron facial palsy, loss of vision and other focal neurological deficits were seen in 6 patients.

Table 1. Socio-demographic profile of patients (N = 22)

Variable		frequency	percentage
Age	< 10 years	4	18.2
	10 - 20 years	4	18.2
	21 - 30 years	12	54.5
	> 30 years	2	9.1
Gender	Male	14	63.6
	Female	8	36.4
Religion	Hindu	18	81.8
	Muslim	2	9.1
	Christian	2	9.1
Region	Rural	14	63.6
	Urban	8	36.4
Occupation	Daily wage worker	12	54.5
	Business	4	18.2
	Student	4	18.2
	Child	2	9.1
Socio-economic status	BPL card holder	17	77.3
	APL card holder	5	22.7

Table 2. Clinical profile of Patients (N=22)

Findings		**Frequency**	**Percentage**
Clinical features*	Headache	22	100.0
	Vomiting	18	81.8
	Fever	19	86.4
	Seizures	6	27.3
	Proptosis	3	13.6
	Hydrocephalus	2	9.1
	Papilloedema	15	68.2
	Neck rigidity	3	13.6
	Hemiparesis	3	13.6
Glasgow coma scale	E2V2M5(moderate)	3	13.6
	E3V2M5(moderate)	2	9.1
	E3V3M5(moderate)	3	13.6
	E3V4M5(moderate)	4	18.2
	E4V5M6(Normal)	10	45.5
Pre-existing illness*	CSOM	16	72.7
	Sinusitis	8	36.4
	Diabetes Milletus	5	22.7
	Allergic rhinitis	2	9.1
	Mucor mycosis	1	4.5
Source of infection	Otogenic	15	68.2
	Sinusitic	7	31.8

Duration illness	upto 20 days	4	18.2
	21 - 40 days	12	54.5
	more than 40 days	6	27.3
Number of days lost before admission	< 10 days	2	9.1
	10-20 days	5	22.7
	21-30 days	14	63.6
	> 30 days	1	4.5

*Multiple symptoms

Table 3. Radiological Profile of Patients (N=22)

Findings		Frequency	Percentage
Size of abscess*	< 2 cm	4	18.2
	2-5 cm	18	81.8
	> 5 cm	2	13.6
Number of abscess	Solitary	19	86.4
	Multiple	3	13.6
Plane of abscess	Epidural	7	31.8
	Subdural	2	9.1
	Intracerebral	13	59.1
Location of abscess			
Supratentorial	Left hemisphere	13	59.1
	Right hemisphere	2	9.1
	Both hemisphere	3	13.6
Infratentorial		4	18.2

Table 4. Surgical Management of Intracranial Abscess

		Aspiration only	Aspiration followed by secondary excision	Primary excision	Conservative treatment
Plane of Abscess	Intracerebral abscess (n=13)	2 (15.4)	9 (69.2)	0 (0.0)	2 (15.4)
	Epidural abscess (n=7)	0 (0.0)	2 (28.6)	5 (71.4)	0 (0.0)
	Subdural abscess (n=2)	0 (0.0)	0 (0.0)	2 (100)	0 (0.0)
Size of abscess	< 2 cms (n=4)	1 (25.0)	0 (0.0)	0 (0.0)	3 (75.0)
	≥ 2 cms (n=21)	2 (9.5)	11 (52.3)	8 (38.1)	0 (0.0)

Table 5. Outcome of Intracranial abscess

Variables		Uneventful	Recurrence/complication	P value
Age	< 20 years (n=8)	4 (50.0)	4 (50.0)	0.192*
	> 20 years (n=14)	12 (85.7)	2 (14.3)	
Sex	Male (n=14)	9 (64.3)	5 (35.7)	0.509*
	Female (n=8)	7 (87.5)	1 (12.5)	
Treatment	Primary excision (n=7)	7 (100)	1 (14.3)	0.572*
	Secondary excision (n=11)	9 (81.8)	3 (27.3)	
	Aspiration only (n=2)	1 (50.0)	1 (50.0)	
	Conservative (n=2)	1 (50.0)	1 (50.0)	

Level of Consiousness	GCS: 9-12 (n=12)	7 (58.3)	5 (41.7)	0.237*
	GCS: >13 (n=10)	9 (90.0)	1 (10.0)	
Abscess location	Infratentorial (n=4)	4 (100)	0 (0.0)	0.497*
	Supratentorial (n=18)	12 (66.7)	6 (33.3)	
Source of infection	Otogenic (n=15)	11 (73.3)	4 (26.7)	0.918*
	Sinusitic (n=7)	5 (71.4)	2 (28.6)	

*Fisher exact test done

Figure 1. Brain abscess presenting as proptosis of left eye

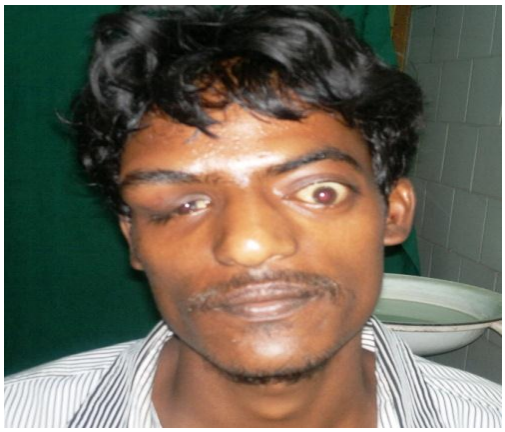


Figure 2. Right parietal temporal brain abscess

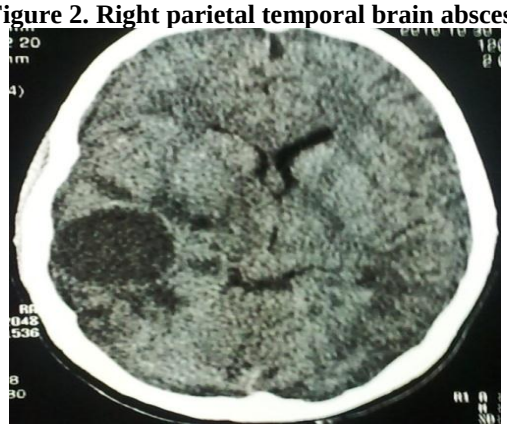


Figure 3. Left parietal brain abscess

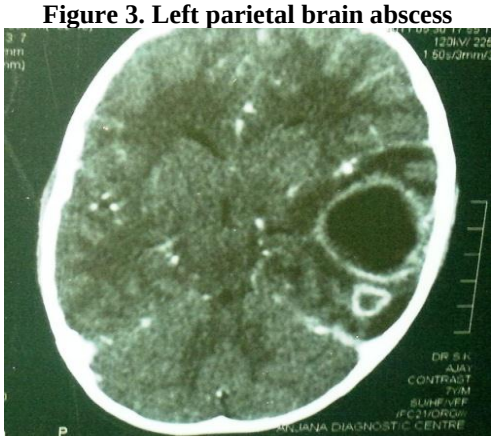


Figure 4. Left parietal brain abscess with mass effect (midline shift)

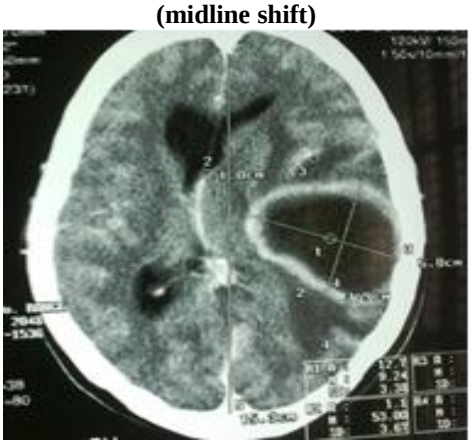
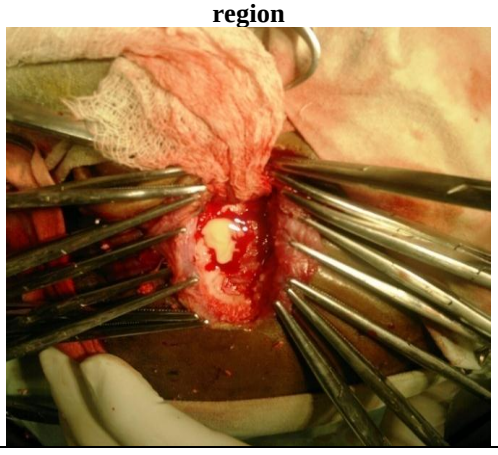


Figure 5. Pus coming out spontaneously from left parietal region



DISCUSSION

In some underdeveloped countries, brain abscess accounts for 8% or more of all intracranial space occupying lesions, a sharp contrast to most developed nations where brain abscess constitutes only around 2% of all intracranial lesions [16]. In the present study we noticed that brain abscess could occur at any age. The mean age of occurrence of intracranial abscess was 19.8 ± 9.7 years (range being from 5 years to 35 years). The most affected age group was 21–30 years. However, S Menon et al [17] found that most affected age group was 11–20 years. McClelland et al [18] found that this disease occurs most often in the middle decades of life. Sinha et al [9] reported 74.89% of their patients were below 20 years of age and similarly Mohammad quasim et al [19] found that the mean age of occurrence was 12.6 + 9.7 which is comparable to our study. Brain abscess is uncommon below the age of 2 years, but however there are occasional reports of brain abscess in infants documented in the literature [20,21]. A preponderance of males over females (3.5:2) was found amongst the patients in the present study. Similar observations have been reported in studies from different parts of world[9,10,17,18,22]. It is clear from all these studies that males are more vulnerable to brain abscess irrespective of the geographical region for reasons that remain unclear. Majority of the cases were from Hindu religion (81%) and most of the cases were hailing from rural areas (63%) with a low socio-economic status (77%). About half of the cases were daily wage workers indicating that brain abscess is more common among poor lower socio-economic status.

In the present study headache, fever, and vomiting made an important triad of symptoms which were present in 50% of patients. The predominant symptoms of the cases were headache (100%), vomiting (81%) followed by fever (86%). However the classical triad of brain abscess i.e headache, fever and focal neurological deficit was seen in only one case. Fever has been reported as the important presenting symptom in brain abscess patients by many workers; however, the absence of fever does not exclude the diagnosis and moreover no particular constellation of symptoms or signs is pathognomonic for brain abscess. Therefore the classic triad of headache, fever and neurological deficit cannot be used as a sensitive marker for the diagnosis of brain abscess. A similar finding has been reported by Ni et al [23]. Papilloedema is another common sign suggestive of raised intracranial pressure which was present in 15(68.2%) cases. An alteration in the level of consciousness is usually present in up to two-thirds of the patients [24,25]. In the present study 38% of the patients were brought to the hospital with a Glasgow coma scale score less than 10. The state of consciousness of the patient at the time of admission is usually taken as a reliable prognostic marker.

All patients had a demonstrable infectious source leading to the intracranial suppuration. CSOM was found to be the major source of infection (Table 2). In most large series of brain abscesses from developing countries, middle ear infection has been reported to be the commonest source of intracranial suppuration. This has been reflected in various studies from India [9,14,15,17] and Pakistan [19]. This clearly indicates that in developing countries particularly people from rural areas, belonging lower socio-economic status have poor health seeking behaviour and thereby often neglect an ear infection and not get treated aggressively, while in developed countries the incidence of complication of CSOM has come down to 0.04% of all cases of suppurative ear disease [26]. In our study we also noticed that otogenic abscesses are usually solitary and located commonly either in the temporal lobe or posterior fossa area. Similar reports have appeared in the literature [27,28].

The brain lobe affected usually depends on the predisposing factor that led to the development of the brain abscess. In our study, the most common lobe involved was the temporal lobe because CSOM was found to be the major predisposing factor (Table 2). We found that 71.4% of the otogenic abscesses were in the temporal lobe. Similar observations have been reported by others [9,10,14,17].

Under the cover of appropriate antibiotics all patients with intracerebral abscess (13 cases) with a diameter of more than 2 cms were managed first by aspiration to reduce the mass effect and later secondary excision was done in case of recurrence. But in cases of intracranial epidural abscess and subdural abscess primary excision was done. However abscess less than 2 cms was managed conservatively using antiboitcs. A similar approach was adopted by Muhammad Qasim et al [19], Basit et al [29], Malik et al [30], Atiq Mehnaz et al [31] where therapy was most often a combination of surgical aspiration with or without excision in addition to antimicrobial therapy.

Mortality ranging from 8 to 53% has been reported in other studies. Various factors contribute to mortality, the important factors being the age of the patient, the level of consciousness at the time of admission, multiplicity of abscesses and the nature of the infection. In our study complications were common among patients who had coexisting space occupying lesion, large abscess (more than 5 cms) with a midline shift and uncontrolled diabetes. In our study one patient died and other complications like recurrence, transient upper motor neuron facial palsy, loss of vision and other focal neurological deficits were seen in 6 patients.

Sarala Menon et al [17] observed 9.5% mortality, and a statistically significant association was shown between the age of the patient and mortality and however Beller et al [22] could not find a significant correlation between the age of the patient and mortality in their study. The level of consciousness at presentation has been shown by other authors to be of great prognostic value [18,32].

CONCLUSION

Brain abscess is a serious infection which must be diagnosed early and treated aggressively. In majority of the cases of intracranial abscess are associated with common predisposing factors like CSOM, sinusitis and others. Headache, fever, and vomiting made an important triad of symptoms which is commonly present in more than half of the patients. Management of intracranial abscess should be individualized depending upon the various important factors like age of the patient, the level of consciousness at the time of admission, multiplicity of abscesses, the nature of the infection and plane and level of the abscess.

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CONFLICT OF INTEREST: NIL

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