



**Intracranial Brain Abscess- An Institutional Experience In A Tertiary Care Set Up.**

Dr.P.K Swarnakar , Dr R. N. Panda, Dr. Deepak Bansal, Dr M K Dhir, Dr S. Mishra

Dept of Neurosurgery, SCBMCH, Cuttack, Odisha

**Corresponding Author:** Dr.P.K Swarnakar, Dept of Neurosurgery, SCB MCH, Cuttack, Odisha

**Type of Publication:** Original Research Article

**Conflicts of Interest:** Nil

**Abstract**

**Introduction**

An abscess can occur in any part of the body but the problem of "Brain Abscess" is as much due to space occupation in a closed cavity as due to infection itself. Brain abscess as such is a benign and potentially curable condition, but it behaves in a malignant way.

**Aim and Objective:** This study which has been taken up at S.C.B. Medical College Hospital, Cuttack from November, 2015 to February, 2018. The aims and objectives were to find out the clinico-pathological pattern of brain abscess in the state of Orissa and to outline better modality of treatment in order to minimize the mortality and morbidity. This institution is the premier institute in the state with neurosurgical facilities and availability of modern diagnostic facilities. Hence it projects the situation in the whole state.

**Result**

Within the period of study from November 2015 to February 2018 average number of patients admitted to the Neurosurgery ward per month is 83, out of which thirteen were ICSOL and out of which again one case is brain abscess. The incidence of brain abscess comes about 8% of ICSOL. (Table NO.1). Hence it is almost same incidence as that reported by Bhatia et al (1994). But one thing should be kept in mind that actual number of cases

occurring in the society may be much more, since many people cannot afford to come to this only institution of the state for neurosurgical care and pay for costly investigations like CT scan which is badly necessary for diagnosis and management. The sex incidence is male: female =3:1 against 2: 1 in most other series. (Table - 2). This fore tells that health care service to female .child is further curtailed in our society.

**Conclusion**

Brain abscess is a focal infection of CNS which often presents as a common curable cause of ICSOL in our state. Because of younger age group of affection this is a socio-economic problem with much financial loss for the State.

**Key word** -Brain Abscess, Otogenic, Rhinogenic

**Introduction**

An abscess can occur in any part of the body but the problem of "Brain Abscess" is as much due to space occupation in a closed cavity as due to infection itself. Brain abscess as such is a benign and potentially curable condition, but it behaves in a malignant way. It continues to be a perplexing problem, because the mortality and morbidity associated with them remains high. At the onset of antibiotic era in 1940's there was an initial drop in mortality and morbidity, but thereafter it remained at that high level? Again there was a

sharp decline in mortality and morbidity due to advent of computerized tomography scan. Over and above better microbiological technique for identification of organisms, more effective antibiotics regimen, use of operating microscope, stereo tactic technique, and real time preoperative ultrasound imaging have helped in the better management of brain abscess patients. Nevertheless controversies still roams about in the management of brain abscess. In the developed countries it is generally regarded as a rare disease with large autopsy series reporting 0.18 to 1.3 per cent. It has been estimated that brain abscess account for approximately 1 out of every 10,000 general hospital admission. In the developing world brain abscess is one of the commonest intracranial space occupying lesion (ICSOL) and remains as a significant health problem particularly in children in lower socioeconomic strata. Bhatia and Associates in 1973 reported that 8% of all intracranial lesions in India were focal pyogenic collections. Now at some places brain abscess is increasing in frequency possible due to growing number of immune-compromised patients and also due to better diagnostic facilities. Approximately 25% of Brain abscess occurs in children below 15 years. Brain abscess in a child less than 2 years of age is distinctly unusual. onsuggest an associated gram negative bacillary meningitis.

**Aim And Objective:** This study which has been taken up at S.C.B. Medical College Hospital, Cuttack from November, 2015 to February, 2018. The aims and objectives were to find out the clinico-pathological pattern of brain abscess in the state of Orissa and to outline better modality of treatment in order to minimize the mortality and morbidity. This institution is the premier institute in the state with neurosurgical facilities and availability of modern diagnostic facilities. Hence it projects the situation in the whole state.

## Materials

This study will include patients with Brain abscess who were treated in the Department of Neurosurgery, SCB Medical College, Cuttack, between November - 2015 to February – 2018

- a. Features of raised intracranial pressure.
- b. Presence of focal neurological deficit.
- c. With known source of infection such as CSOM or Sinusitis or in a child with cyanotic heart disease or history of trauma.
- d. Contrast enhancing ring lesion in C.T. Scan.

Case records containing details of the patients at the time of initial assessment, at the time of surgery and follow up data will be evaluated. The data will be analyzed keeping aim and objectives in mind.

## Methods

The plan of the work was as follows:

1. Patient particulars noted: Name, address, Age, Sex, Registration Number, and Date of admission.
2. Symptoms Headache, vomiting, fever, seizure, vision defect, weakness of limbs, speech disorder etc. were specially asked for.
3. Past History: CSOM, Sinusitis, CHD, trauma etc. were noted.
4. Signs: Nutrition, Anemia, Cyanosis, dehydration, pulse, temperature, conscious level, aphasia, paresis, visual field loss, neck rigidity, papilloedema, in coordination etc. if present were observed.

## Observation

Study conducted in the Department of Neurosurgery, S.C.B. Medical College, Cuttack from November , 2015 to February, 2018. During this period 31 patients were diagnosed to be having brain abscess. Provisional diagnosis was made by history, clinical evaluation, different laboratory investigations and radiology. Cases

were treated with antibiotic therapy. Surgery was contemplated only where there was indications. Following observations were noted.

During this period of study total number of intracranial tumours of various types admitted to the Neurosurgery Ward were 345, and out of which 31 cases were having brain abscess.

**Table No. – 1: Showing Incidences Of Brain Abscess**

Number of intracranial tumor	Number of brain abscess	percentage
345	31	8.3%

Of which 13 were ICSOL and out of which again 1 case is brain abscess. The incidence of brain abscess comes about 8% of ICSOL. (Table NO.1). Hence it is almost same incidence as that reported by Bhatia et al [98](1994).

Loftus et al [99] showed a incidence rate of 1-2% in western population. Another study in india by Kulwant singh Bhaikhel [100] showed a incidence of 12.5% .

Recent studies from India have reported an average of 9 to 15 cases per year. [88][102][103] While studies from developed countries recorded a lower number, 5–12 cases per year [104][105][106]

**Table No. – 2: Showing Sex Distribution In Brain Abscess And Its Relation To Mortality**

Sex	No Of Cases	Percentage	Mortality	Percentage
Male	24	77.4	3	12.5
Female	7	22.6	1	14.28

The sex incidence is male: female =3:1. (Table - 2). This fore tells that health care service to female .child is further curtailed in our society.

In studies by Berlit et al [107] the incidence of brain abscess is more common in males compared to females where male female ratio was 3:1 respectively.

Sinha et al [108] also recorded the incidence of brain abscess is more common in males compared to females where male female ratio was 2.72: 1

**Table No. – 3: Showing Incidences Of Brain Abscess In Relation To Age Groups, Source Of Infection And Mortality**

Age	Ot	RH	CHD	Tr.	Mt	Un	Total	%	Mortality	%
0 - 1	-	-	-	-	-	2	2	3.25	0	0
1 - 5	-	-	-	-	2	-	2	6.5	0	0
6 - 15	7	2	-	-	5	-	14	45.2	3	14.28
16-25	7	3	-	-	-	-	10	29	1	11.11
26-35	-	1	-	-	-	-	1	6.5	0	0
36-45	-	-	-	-	-	-	-	-	-	-
46-55	-	-	-	1	-	-	1	9.75	0	0
56-65	-	-	-	-	1	-	1	3.25	0	0
66+	-	-	-	-	-	-	-	-	-	-
TOTAL	14	4	2	1	8	2	31	100	4	9.67
% of source	45.2	12.9	6.4	3.2	25.8	6.4				

Brain abscess is mostly a problem of pediatric age group, since in this series incidence below 15 years is 18 out of 31 (58%) against 25% of Haines et al (71). The incidence for otogenic abscess is maximum from 6to 25 years (45.2% of total).The Incidence of rhinogenic abscess is maximum 16-35 years.[12.9% of total] The incidence for cyanotic heart disease causing abscess is maximum from 5 to 15 years (6.4%of total). The incidence for metastatic is maximum from 1 to 15 years. In to maximum incidence is in age group 6 to 15 years (45.2%). The median age of presentation is less in comparison to the series by Harris et al [114] The increased incidence in paediatric age group in our series is due to lack of nutrition, poor immunity status and increased susceptibility of our children.

Nathoo et al. [94] reported that otorhinogenic infections (38.5%) and trauma (32.8%) were the two most common causes of brain abscess in South Africa Yang et al.[115] observed otogenic abscess cases are 37%.

Malik et al [116]recorded a rate of 34% of otogenic abscess cases. But our result correlate with the findings of Lakshmi et al[117] and Bhardwaj et al.[118] The percentage of different types of abscess according to source of

infection in this series can be compared to that of Haines et al. [119]

Otogenic: 45% against 50-60% of Haines

Rhinogenic 12.9% against 12-18%

Traumatic: 3.2% against 8-12%

Metastatic: 25.8% against 10-15%

Unidentified: 6.4% against 0-6%

The low incidence of traumatic abscess in this series may be due to better wound care and higher antibiotics. Increased incidences of metastatic abscess may be due to delayed diagnosis and management of cyanotic heart disease.

**Table 4: Clinical Features**

No.	Clinical features	Total no of patients	Percentage
1.	Headache	25	79.67
2.	Nausea/ vomiting	18	57.63
3.	Fever	16	52.54
4.	Seizure	7	22.03
5.	Altered sensorium	10	30.50
6.	Focal neurological deficit	9	28.81
7.	Pupillary abnormality	4	13.56

In present study the most common presenting symptom was headache seen in 25 patients(79.7%) which was followed by nausea/vomiting in 18 patients (57.6%). Other presenting symptoms included fever, altered sensorium, focal neurological deficit, seizure and pupillary abnormality.

The most common clinical symptoms in patients were features of raised intracranial pressure- headache, nausea/vomiting in 82.25% and 62.65% patients respectively. other symptoms were seizure, altered sensorium and focal neurological deficit. Studies by Morgan et al [120] and Nielsen et al [121] showed similar presentation.

**Table No. – 5: Showing Site Distribution Of Brain Abscess And Its Relation To Mortality**

Site	No. Of Cases	%	Mortality	%
Frontal	7	22.6	2	28.57
Temporal	9	29.0		0
Parietal	10	32.3	1	10.0
Occipital	2	6.5		0
Cerebellar	5	16.1	1	20.0

The site of incidence is maximum in parietal followed by temporal, frontal, cerebellar and occipital. This roughly confirms other series (W.Michael Scheld) [12]. But again may vary according to source of infection. Death rate is maximum in occipital and frontal abscess; cause may be much less clinical features till fatal end with coning occurs.

However, in a study carried out by Cavusoglu et al. [122], the temporoparietal region was the most commonly affected location

**Table No. – 6: Showing Incidences Of Brain Abscess In Different Brain Compartments And Its Relation To Mortality**

Compartment	No. Of Cases	%	Mortality	%
Supratent	26	83.9	3	11.53
Infratent	5	16.1	1	20.0

The ratio of temporal to cerebellar presentation is roughly 2:1. It confirms to other series. The incidence of supratent abscess is about 5 times in comparison to infratent abscess. Mortality rate is also higher in supratent than in infratent. The cause could be early presentation in infratent abscess. (Table No.6).

**Table No.– 7: Showing Incidences Of Different Types of Abscess In Relation To Mortality**

Types	No. Of Cases	%	Mortality	%
Single Unilocular	23	74.2	1	4.34
Multilocular	5	16.1	2	40
Multiple	3	9.7	1	33.33

Incidence of single unilocular abscess is maximum (74.2%) but the mortality rate is maximum in multilocular abscess (40%). This may be because aspiration alone does

not bring down intracranial pressure effectively in multilocular abscess. Also during excision of multilocular abscess serious complications like inadvertent opening of ventricular system can occur. (Table No.9).

**Table No. – 8: Showing Number Of Organisms Involved And Mortality**

Organism	No. Of Cases	%	Mortality	%
Single	19	61.3	1	5.26
Multiple	7	22.6	3	42.85
Sterile	5	16.12	0	0

In 83.9% of cases pus culture revealed organism, because antibiotics treatment started after collection of pus either by aspiration or excision. In more One-third cases (32.3%) organism was more than one (Table No.8).

A culture positivity for brain abscess pus specimens of 44–100% has been reported in the literature (De Louvois et al.,<sup>[63]</sup> 1977) ,Chandramuki et al.<sup>[123]</sup>, 1980,Sinha et al.,<sup>[108]</sup>. 2003

**1. Table No. –9: Showing Types Of Organism**

Organism	No. Of Case	Percentage
Aerobic	19	61.3
*Strept	9	22.6
*E.Coli	3	12.9
*ps.aeruginosa	4	12.9
*Proteus	2	9.7
*Klebsiela	1	6.4
*Staph aureus	1	3.2
Anaerobic	7	22.6
* B. Fragilis	2	6.4
* Peptostrepto	4	16.1
*Fusobacterium	0	0
*citrobacter	1	3.2

In 22.6% of cases anaerobic organisms were involved as against 61.3% of aerobic. This confirms to other's findings (panikar)<sup>[9]</sup> and brings to light importance of anaerobic organism as a causation of brain abscess. (Table No.9). Amongst individual organisms, peptostreptococci which is anerobic cocci, is involved in most cases (16.1%). Death rate was also more in anaerobic infections than aerobic.

## Conclusion

Brain abscess is a focal infection of CNS which often presents as a common curable cause of ICSOL in our state. Because of younger age group of affection this is a socio-economic problem with much financial loss for the State.

Early diagnosis is important for lowering mortality and morbidity. Hence awareness among general physicians, paediatricians and Otorhinologists to this dreadful neurosurgical complications should be raised. Good ENT care at primary level will diminish the incidence and decrease mortality by early referral to neurosurgeon. Any case presenting with signs of raised ICP with or without localizing neurological deficit with known source of infection such as CSOM or sinusitis or in a child of cyanotic heart disease, should first be suspected to be a case of brain abscess they should promptly be referred for neurosurgical care and urgent attention should be given to such unfortunate victims. Therefore, availability of CT scan and neurosurgical care to more and more people is necessary to bring down the mortality and morbidity of brain abscess.

## References

1. Nicolosi A, Hauser WA, Musicco M, Kurland LT: Incidence and prognosis of brain abscess in a defined population: Olmsted County, Minnesota, 1935-1981. Neuroepidemiology 1991;10:122-131.
2. Canale DJ: William Macewen and the treatment of brain abscesses: Revisited after one hundred years. J Neurosurg 1996;84:133-142.
3. Rosenblum ML, Hoff JT, Norman D, et al: Decreased mortality from brain abscesses since advent of computerized tomography. J Neurosurg 1978;49:658-668.
4. Tonon E, Scotton PG, Gallucci M, Vaglia A: Brain abscess: Clinical aspects of 100 patients. Int J Infect Dis 2006;10:103-109

5. GE Johnson JP, Clinical infectious disease 1997;25:763-781.
6. OsenbachRK,LoftusCM:Diagnosis and management of brain abscess.NeurosurgClin N Am1992;3:403-420.
7. Bhatia R,TandonPN,Banerji AK: Brain abscess-an analysis of 55 cases.Int Surg1973,58:565-568.
8. Lakhmi V,R.RRao,Dinakar I:Bacteriology of brain abscess-observations on 50 cases.J.Med.Microbiol.vol-38(1993):187-190.
9. *Ananthanarayan&Paniker. T.B. of Microbiology. 1990- 4th Edn*
10. Blgovehchenskala et al, Specific features of rhinosinusogenic brain abscess. In adults &children. 1989 - VestnOtorhinolaringol July-Aug (4); 37-42.
11. Britt RH, Enzmann DR, Yeager AS. Neuropathological and computerized tomographic findings in experimental brain abscess. J Neurosurg. 1981;55:590-603Tunkel AR, Scheld WM. Pathogenesis and pathophysiology of bacterial infections. 2<sup>nd</sup> ed. Philadelphia: Lippincott-Raven; 1997;297-312
12. In: Scheld WM, Whitley RJ, Durack DT, eds. Infections of the Central Nervous System, 2<sup>nd</sup> ed. Philadelphia: Lippincott-Raven; 1997;297-312
13. Tunkel AR, Scheld WM. Pathogenesis and pathophysiology of bacterial infections. 2<sup>nd</sup> ed. Philadelphia: Lippincott-Raven; 1997;297-312