



## Original research Article

## A cross sectional study of prevalence, clinical profile and CT scan features of intracranial space occupying lesions

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## ABSTRACT

**Introduction:** Intracranial space occupying lesion (ICSOL) are infective and non-infective conditions, which can infect and occupy space in brain parenchyma. These ICSOL produce characteristic symptom and signs. If these symptom and signs are identified at an early stage of disease, more than half of these ICSOL are amenable to treatment

**Objective:** Our study was done to identify the incidence of ICSOL in our city, along with the various co factors such as the gender, age socioeconomic condition and other risk factors. We also determined the prognosis of various ICSOL and

**Materials and Methods:** Patients admitted in RKDF Medical College and Hospital, Bhopal in the department of Medicine, Neurology and Neurosurgery department with history and clinical features suggestive of intracranial space occupying lesion.

**Results:** The study sample size included 30 patients. Of the 30 patients studied, 17 were male and 13 were female patients. Infective ICSOL was found to be more common in young age, while non infective was more common in old age.

Common infective(16) causes, were Neurocysticercosis, Tuberculoma, Toxoplasmosis and Brain abscess. Non infective ICSOL accounted for 14 cases. Common non infective ICSOL were Glioma meningioma had the second highest incidence.

**Conclusion:** The prevalence of ICSOL was found to be around 0.01%. Infective SOL was found to be more common in males during second and third decade. While Non infective SOL was found to be more common in females during sixth and seventh decade. ICSOL were associated with features of raised ICT, seizure or focal neurological deficit.. Radiologically, they were characterized by multiple or single well circumscribed ring-enhancing lesion.

**Aims and Objectives:** 1: To find out the prevalence of intracranial space occupying lesion (ICSOL) and different causes of intracranial space occupying lesion in RKDF Medical college hospital and research center Bhopal during one year period between 01/03/2018 - 28/02/2019. 2: To find out the clinical features and CT Scan features of various intracranial space occupying lesion and their correlation (CT/Clinical).

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### 1. Introduction

Intracranial space occupying lesion (ICSOL) is a broadly used term for various infective and non-infective conditions, which can infect, infest and occupy space in brain parenchyma.

These intracranial space-occupying lesions, by their presence in Brain parenchyma produce characteristic symptom and signs. If these symptom and signs are identified at an early stage of disease, more than half of these intracranial space-occupying lesions are amenable to treatment.

Following are the various causes of intracranial space occupying lesion:

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- a) Infective
- b) Non infective

### 1.1. Infective

**Table 1:** Bacteria

Mycobacterium tuberculosis.	Haemophilus species.
Mycobacterium avium Intra cellulare.	Bacteroides
Treponema pallidum	Fusobacterium
Nocardia.	Enterobacteriaceae.
Listeria monocytogenes.	Pseudomonas aeruginosa.
Aerobic streptococci milleri.	Staphylococcus aureus.
Anaerobic streptococci.	Actinomyces.

**Table 2:** Fungi

Cryptococcus neoformans.	Mucormycosis.
Candida albicans.	Coccidioidomycosis
Aspergillus	

#### 1.1.1. Parasites

Toxoplasma gondii. Cysticercosis

### 1.2. Non infective: Tumor & Gliomas

**Table 3:**

<b>Gliomas</b>	<b>Meningioma</b>
Glioblastoma multiforme	Pituitary adenoma
Astrocytoma	Neurinoma (schwannoma)
Ependymoma	Metastatic carcinoma
Medulloblastoma	Primary CNS Lymphoma
Oligodendrocytoma.	Craniopharyngioma
Dermoid	Teratoma
Epidermoid	Angiomas
Sarcomas	Pinealoma
Chordoma	Granuloma

The intracranial space-occupying lesion produces characteristic sign and symptoms:

#### 1.3. Symptom and sign of raised intracranial pressure

Headache. Vomiting

Nausea Papilledema.

#### 1.4. Symptom and sign of intracranial space occupying lesion.

Seizures

Focal neurological deficit

### 1.5. Others

Fever

Nuchal rigidity.

Among these intracranial space occupying lesion, following are important causes at intracranial space occupying lesion.

### 1.6. Infective

1. Brain abscess
2. Neurocysticercosis
3. Toxoplasmosis
4. Tuberculom

#### 1.6.1. Non infective

Glioma

Meningiomas

## 2. Material and Methods

In this study we have selected Patients who were admitted in RKDF Medical College and Hospital, Bhopal in the department of Medicine, Neurology and Neurosurgery department between 01/03/2018 - 28/02/2019 for a period of one year, with history and clinical features suggestive of intracranial space occupying lesion. Alternatively, we have taken those Patients who were referred from periphery clinic of RKDF Medical College Bhopal to the department of Medicine; Neurology and Neurosurgery were also taken in our study. There detail presenting complain, duration of illness, past medical illness, age, sex, socioeconomic detail, and other demographic history was taken in prescribed format.

#### 2.1. Inclusion criteria

1. Patients with history suggestive of intracranial space occupying lesion.
2. Patients with signs of raised intracranial tension, headache, focal Neurological deficit (such as hemiplegia, monoplegia, motor-sensory Deficit etc.) And seizure.
3. All these patients with symptom and signs of intracranial space occupying lesion were subjected for CT scan study.

#### 2.2. Exclusion criteria

1. Patients with underlying CNS disorder.
2. Patients with neurodegenerative disorder, cerebrovascular accident such as Intracranial hemorrhage, Intracranial Infarct, cerebral venous thrombosis, trauma and other chronic disorder not related to SOL.

### 2.3. Methods of collection of data

Patients who fulfilled inclusion criteria were studied in details with respect to detail history, physical signs, laboratory investigations and CT scan.

Patients with symptoms and sign suggestive of intracranial space occupying lesion underwent CT scan. Depending upon the nature of intracranial space occupying lesion these patient underwent further investigation. For example

\* Serum for Toxoplasma antibody.

\*Serum and CSF antibody for Tuberculosis and Cysticercosis etc.

### 3. Results

The study sample size included 30 patients.

#### 3.1. Patients characteristics of our study

In our study, there were 30 patients, 17 were male and 13 were female patients.

Maximum numbers of patients were between 20-30years in case of infective intracranial space occupying lesion

Maximum numbers of patients were between 51-70years in case of infective (tumor) intracranial space occupying lesion.

#### 3.2. Infective Icsol

In this study, Infective intracranial space occupying lesion accounted for 16 cases [ $>50\%$ ]. Among the infective causes, Neurocysticercosis has the highest incidence and brain abscess has the lowest incidence. There were 6 cases of Neurocysticercosis, 5 cases of Tuberculoma, 3 cases of Toxoplasmosis and 2 cases of Brain abscess. The incidence of Neurocysticercosis, Tuberculoma and Brain Abscess was higher in males while the incidence of Toxoplasmosis was found to be higher in females.

#### 3.3. Clinical features of our study

**Neurocysticercosis:** There were six patients (37.5%) of Neurocysticercosis. All cases of Neurocysticercosis presented with seizure, 4 patients had focal seizure and two patient had generalized seizure and headache.

**Tuberculoma :** There were five patients (31.2%) of Tuberculoma. Three patient had features of raised intracranial tension i.e.; Headache vomiting. Two patients had generalized seizure. One patient had left side cerebellar, trigeminal, abducent and facial nerve involvement. The lesion was in pons. One patient had Hemiparesis and raised ICT features.

**Toxoplasmosis :** There were three patients (13.7%) of Toxoplasmosis. Two patients presented with Hemiparesis, between these two patients, one patient had features of raised ICT. Third patient presented with features of raised ICT. All three patients were positive for HIV I/II by ELISA

—method. All three patients serum was positive for IgG antibody for Toxoplasmosis.

**Brain Abscess** There were two patients (12.2%) of Brain abscess. Both patients had features of raised ICT. Both patients were less than 20years. One patient had focal seizures. Both patients cytology showed staphylococcal organism.

Ct scan of infective intracranial space occupying lesion

**1) Neurocysticercosis :** Among the six cases of Neurocysticercosis three of them were solitary and three of them were multiple. They were characterized by well-circumscribed ring enhancing lesion. Two of the cases had perilesion edema and mid line shift [mass effect]. Multiple calcifications were present in one case.

**2) Tuberculoma :** All five cases had a solitary lesion. Four of the cases had supratentorial and was infratentorial [pons] location. Two of these cases had a lesion in frontal region and two of them were in parietal region by irregular contrast enhancing lesion. Two of the cases had perilesion edema and mid line shift None of the patients had hydrocephalus or other complication.

**3) Toxoplasmosis :** Among three cases of toxoplasmosis, two of them had multiple lesion and one was solitary. Two patients had a lesion in basal ganglion region and one of them was in fronto thalamic region. They were characterized by irregular ring enhancing lesion. Two patients had perilesion edema with midline shift. None had hydrocephalus or other complication.

**4) Brain Abscess :** Between two cases, one had solitary lesion and one had multiple lesion. Both of them were located in temporo parietal region. They were characterized by well circumscribed contrast enhancing lesion with perilesion edema and mid line shift. None had hydrocephalus.

#### 3.4. Non infective icsol [tumors]

Non infective ICSOL accounted for 14 cases (47%). Among tumors,

Glioma had the highest incidence and meningioma had the second highest incidence. There were eight cases of glioma (50%). There were three cases of meningioma(21.4%). There was one case of acoustic neuroma, pituitary tumor apoplexy, and epidermoid accounting for 7.1% for each of them. The incidence was found to be higher in females. [male: female: 6:8].

#### 3.5. Clinical features

Among 13 cases 12 patients presented with features of raised ICT; Headache and seven of them had projectile vomiting. Six patients came with hemiplegia / monoplegia. Five patients had cranial nerves involvement [three facial, one vestibulo-cochlear, one abducent]. Two of these patients with cranial nerve involvement also had cerebellar signs. Three patients had seizures [two focal, one generalized].

**Ct Scan:** Among fourteen, Nine were supratentorial, three were infratentorial and two of them had extension on either side. Gliomas were characterized by well-defined ring enhancing lesion with variable hemorrhage and necrosis in anaplastic gliomas. Two of the gliomas had perilesion edema and mass effect. One of the glioma was associated with hydrocephalus. Meningiomas were characterized by well-defined hyperdense masses. Two of them were associated with perilesion edema and one of them was associated with hydrocephalus. Acoustic neuroma was associated with expansion of internal auditory canal on right side. Pituitary apoplexy was associated with hemorrhage into pituitary tumor and subarachnoid hemorrhage.

All these ICSOL were treated according to their respective diagnosis.

#### 4. Discussion

Intracranial space occupying lesion is responsible for significant morbidity and mortality. As each and every patient of intra cranial space occupying lesion has to undergo various investigation they pose a significant financial burden on individual and society. In developing countries more than half of the cases of intracranial space occupying lesion are due to infective etiology. These infective intracranial space-occupying lesion can be reduced by improving socio-economic conditions and hygiene. These intracranial space occupying lesion have a better prognosis if they are detected and treated at an early stage.

In our study, the prevalence of intracranial space occupying lesion was found to be 0.01 percent. Infective intracranial space occupying lesion were responsible for 53% of the cases while non infective were responsible for 47% of the cases. Among non infective causes, Glioma was responsible for 57% of the cases in our study while reported incidence of Glioma is 45% in western countries [Adams .R.D, victor.M. "intracranial neoplasm and paraneoplastic disorders" chapter 31 principles of neurology 1997], The incidence of meningioma was 21.4% in our study, while reported incidence of meningioma is 15% in western countries. There were 7.1% incidence of acoustic neuroma, epidermoid tumor and pituitary tumor each. Similar incidence has been reported in other text [Harrison "Tumors of the nervous system" Chapter 375, Principle of internal medicine 14<sup>th</sup> edition.]. Similar incidence of various intracranial neoplasm were observed in a study by Zantye. A: in a study on clinical of partial seizure in Belgaum [Doctoral dissertation, University of Dharwad, Karnataka 1998-99 p.60.]

Among infective causes, in our study Neurocysticercosis was responsible for 37.5% of the cases, Tuberculoma for 31.2%, Toxoplasmosis for 13.7% and Brain abscess for 12.2% of the cases. The reported incidence of Neurocysticercosis and Tuberculoma in our country is similar to our study, while the incidence of Toxoplasmosis

has increased. [Zantye.A: A study on clinical profile of partial seizure in Belgaum, Doctoral dissertation, University of Dharwad, Karnataka 1998- 99 p.60.]. The incidence of AIDS associated SOL was found to be high in our study as well as in other studies. [Das.C.P.Sawhney.M.S. "Neurological complications of HIV infection," Neurology India 1998,82- 93.]. [Matew.M.T. Chandy.M.J. "CNS Toxoplasmosis in AIDS," Neurology India 1999;47;182-187.] among infective SOL In our study, Neurocysticercosis had the highest incidence and similar trends were observed by other studies. [Garg.R.K; "Neurocysticercosis]. Post-graduate medical journal 1998;74;321-26]. The incidence of Brain abscess was found to be low and similar trends were observed in other studies. IMathlsen .E.G, Johnson .P.J. "Brain abscess," clinical infectious disease 1997;25:763-81.]

In the past few years the reported incidence of brain abscess has decreased and toxoplasmosis has increased. [Harrison "HIV: AIDS and related disorder; chapter 308 Principle of internal medicine 14<sup>th</sup> edition.]. Harrison "Brain abscess, bacterial meningitis and other suppurative intracranial infections, chapter 377 Principle of internal medicine 14<sup>th</sup> edition].

The infective intracranial space-occupying lesion were most common in second and third decade of life in our study. While non-infective intracranial space occupying lesion [tumor] were common in sixth and seventh decade.

Neurocysticercosis was found to be more common in male during second and third decade. All these cases presented with history of seizure; two generalized and four focal seizure. Among the six cases, three of them had multiple lesion and three of them had solitary lesions.

Tuberculoma was found to be more common in males during the second and third decade. Three patients presented with features of raised intracranial tension All five patients had solitary lesion

Toxoplasmosis was found to be more in females during the third decade. , all of them presented with features of raised intracranial tension and two of them had hemiparesis. All patients were HIV positive The lesion was characterized by irregular ring enhancing Lesion.

Brain abscess was found to be more common in males during first and second decade. Both the patient presented with features of raised ICT with constitutional symptoms One patient had solitary lesion while the other patient had multiple lesions.

There were 14 cases of non infective ICSOL. There were 8 cases of Glioma, 3 cases of Meningioma one case each of Acoustic Neuroma, Pituitary apoplexy and Epidermoid tumor. They were found to be higher in females during sixth and seventh decade who Presented with features of raised ICT and space occupying lesion

## 5. Conclusion

The prevalence of intracranial space occupying lesion was found to be around 0.01%.

Infective SOL was found to be more common in males during second and third decade.

Non infective SOL was found to be more common in females during sixth and seventh decade.

Clinically infective SOL were inconsistently associated with features of raised ICT, seizure or focal neurological deficit. They were found to be associated HIV (Toxoplasmosis) or pulmonary tuberculosis (Tuberculoma). Radiologically, they were characterized by multiple or single well circumscribed ring-enhancing lesion.

Among patients with tumors, 90% of the patient had headache and 50% of the patient had focal neurological deficit. Radiologically, they were characterized by irregular contrast enhancing lesion.

## 6. Source of funding

None.

## 7. Conflict of interest

None.

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