

# Clinical profile of intracranial space occupying lesions of brain

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## Abstract

This study is a study of ICSOL admitted in department of medicine GMCH Aurangabad. In this study detail clinical examination of all cases done with contrast CT in each cases. As per the clinical and radiological criterion they were divided into different SOLS. As neurosurgery was not possible at that time to have the histopathological diagnosis so the radiological suspicion is taken as final diagnosis of the SOL. After studying 80 cases in sequence of ICSOL we come to the conclusion that the commonest occurrence is tuberculoma followed by glioma. The commonest presenting symptom was convulsions followed by headache. The commonest CT finding was Ring enhancing region in brain followed by diffuse intracerebral lesions. Anatomically multiple lobes were involved in 40% of cases followed by parietal lobe.

**Key Word:** brain, intracranial space.

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**Occipital lobe:** analysis of vision. When there is lesion in the particular area these functions are hampered.

## MATERIALS AND METHODS

This prospective study was carried out in the Department of Medicine Govt Medical Collage and Hospital Aurangabad from Jan 1998 to Jan 2000. In this study 80 cases of ICSOL were studied in detail at the time of first presentation. In all cases after routine investigations, Plain and Contrast CT was done in all cases. Etiological diagnosis can be reasonably made on the basis of CT findings and clinical correlation.

## OBSERVATIONS AND RESULT

The age rang was between 12 to 81 years. The maximum no of cases were in the 3rd decade i.e. 29 cases (36.25%). There was a male dominance with 43 male: 37 female cases. The commonest presentation was convulsions followed by headache. Seizures were seen in 71% , headache in 68% , vomiting in 47% and motor weakness in 17% of cases studied. In the present study 71% patients had convulsions out of which 88% had generalized convulsions. The commonest type of headache observed was compressive type of headache followed by tension type headache. CT scan diagnosis of ICSOL were tuberculoma 34 cases (42.5%), glioma 13 cases (16.25%), neurocystecerecosis 10 cases (12.5%), secondaries in brain 6 cases (7.5%), astrocytoma 5 cases (6.25%), meningioma 5 cases (6.25%), brain abscesses in 3 cases (3.75%). Thus tuberculoma forming the majority of

## INTRODUCTION

Space occupying lesions of cranium are those lesions which occupy the space, which is normally occupied by the brain. It includes vascular, neoplastic and inflammatory lesions. The clinical features of ICSOL relate to the site of lesion and its rate of expansion. The following mechanisms produce the signs and symptoms.

1. local effects on adjacent cerebral tissue
2. raised intracranial pressure
3. seizures
4. False localizing signs.

To know the details what were the clinical presentation we noted the main functions of each part/lobe of brain.

**Frontal lobe:** personality, emotional response, social behavior

**Parietal lobe (Dominant):** calculation, language, planning movement, appreciation of size and shape.

**Parietal lobe (Non –Dominant):** constructional skills, spatial orientation.

ICSOL followed by glioma as second largest cause for ICSOL. The commonest CT finding was ring enhancing lesion in 44 cases (55%) followed by diffuse lesions 36 cases (45%) and calcifications 11 cases (13.75%). Out of 80 cases of ICSOL studied, in 48 cases ( i.e. 60%) the lesions were more than 20 mm. In 19 cases (i.e. 23.75%) the lesion were between 10 mm and 20 mm. The incidence of affection of multiple lobes was the commonest i.e. 38.75%.The commonest single lobe affected was parietal lobe in 22 cases i.e. 27.5%.the least affected lobe was temporal lobe.The commonest affected lobe in tuberculoma was the parietal lobe in 11 cases (32.35%) and the least affected lobe was the temporal lobe in 1 cases (2.9%). The localizing signs were present in four patients only and out of these 4 patients three patients were of parietal lobe tuberculoma and 1 patient were of neurocysticercosis. In the present study NCC was seen in 10 cases i.e. 12.5% and commonly affecting parietal lobe.

## DISCUSSION

The term ICSOL is generally used to identify any lesion whether neoplastic or inflammatory in origin which increases the volume of intra cranial contents and leads to a rise in intra cranial tension (ICT).In general rapidly expanding lesions produce more profound neurological disturbances and increase in ICT, while slowly growing lesions may reach a large size without a profound deficit. The presentation of ICSOL had changed radically with increased availability of modern imaging techniques like CT SCAN and MRI. The computerized tomography is a non invasive reproducible and highly accurate method which demonstrates the size, location, extent of the SOL and its relation with surrounding structures. The consistency of the mass whether solid or cystic can be identified with CT SCAN and the exact density can be compared with cerebrospinal fluid or brain tissue. Its relation to ventricles can also be easily studied. The CT scan examination can also be identifying the calcific component of the lesion. The CT evaluation of ICSOL gives valuable information's about the lesion if contrast CT is done.

### Age and Sex

The age range of cases of ICSOL in present study was from 12-81 yrs.The peak incidence of ICSOL was in 3<sup>rd</sup> decade (36.25%) followed by 4<sup>th</sup> decade (22.5%).There was a slight male predominance in present study ,with male to female ratio was 1.16 : 1. A. Mukherjee *et al* in 1993 observed peak incidence of ICSOL in 4<sup>th</sup> and 3<sup>rd</sup> decade. In Minnesota study the incidence of ICSOL was seen in middle age group, also ICSOL were common in males. Walker *et al* did similar observation in 1985, during the national survey of intracranial neoplasms.

## Incidence

In present study the incidence of different lesions were as follows.

Tuberculosis	34	cases	42.5%
Glioma	13	cases	16.25%
NCC	10	cases	12.5%
Secondaries	6	cases	7.5%
Astrocytoma	5	cases	6.25%
Meningioma	5	cases	6.25%
Abscess	3	cases	3.75%

Also one case each of (1.25%) each of epidermoid cyst, arachnoid cyst, acoustic neuroma and toxoplasmosis were seen.

The above finding of incidence are comparable to the previous study of Courviell *et al*, except for a lower incidence of brain secondaries and a higher incidence of tuberculoma in the present study.The low incidence of brain secondaries is comparable with study of Walker *et al* in 1985, showing 8.3 per 1 lakh population. There is higher incidence of tuberculoma in the present study. Similar incidence was also reported by Ramamurthi in 1978 (12-20%). The incidence of neurocysticercosishe is comparable with that of Lt. Col. P.C.Sanchetee *et al* in 1993 (14.5)Russel in 1989, also the incidence of meningioma(1 9.5%) astrocytoma (3.48%) is comparable. In the study by Hiller in 1980, glioma was noted in 34.17% of cases. This is higher than the incidence found in our study. Lowry *et al* had mentioned the incidence of glioma as 82% . Also in the study of A. Early Walker in 1985 given the incidence of glioma as 57%. Tuberculoma is the most common inflammatory ICSOL in the present study accounting for 42.5% of ICSOL. The incidence of tuberculoma observed in other studies was 9.6% by Maiti in 1967, 21.5% by Dastur *et al* in 1968 and 20% by A. Bagga *et al* in 1988. Also Ramamurti B. had found the incidence of tuberculoma as 20-30% in different parts of India, being more common in southern India. The incidence of Madras and Bombay were shown as 20-30% but that of Delhi and Calcutta were 5-10%. The variation in incidence of tuberculoma in India could be due to the difference in geographical pattern (A Bagga *et al* 1988). Since out protocol did not include follow-up and no follow-up CT scan were done we cannot comment whether the ring enhancing lesions which we saw initially could have disappeared without specific treatment. We relied on the radiologists opinion and treated all these cases as tuberculomas or NCC in correlation with the clinical presentation. It has also been mentioned by Garg *et al* (JAP) update article 1997 vol 45. No.5 page No.396-399) that in all such patients antituberculous treatment is justified. The second commonest ICSOL, seen in the present study was neurocysticercosis. Cysticecosis is the most frequent

parasitosis of the nervous system. Its incidence in endemic area is between 2-4% in general population as shown by B. Maiti in 1955 and R.K. Garg in 1994. In the present setup patients belonged to low socio-economic status, with poor personal hygiene, poor sanitation, lack of proper water supply and sewage system, which might have made them more susceptible to be infected. (Mukherjee *et al* (1993) and Garg (1994) Acoustic neuroma was observed in one case i.e. 1.25% only which is slightly lower than that observed by Lalitha and Dasture in 1980.

### Clinical features of ICSOL

In the present study the commonest symptom was convulsions, observed in 57 patients i.e. 71.25%. The similar observation was seen in study of Burger *et al* in 1985. The incidence of seizures in ICSOL, mentioned by Arseni *et al* in 1972 and Steplen in 1962 was in the range of 22-94%. Similarly, the Bahita and Tandon in 1988 reported the incidence of seizures as 80%. Out of 57 cases having convulsions, 50(87.80%) had generalized seizures, 4 (7%) had partial seizures and 3 (5.2%) had complex partial seizures. Arseni and Cresescu had reported the incidence of generalized convulsions as 45%, focal convulsions as 24% and mixed convulsions as 31%. Most series from India mention generalized seizures to be more common, than partial seizures mentioned by Dinkar *et al* in 1970, Ramamurthi in 1970 and Mani *et al* in 1974. The second commonest symptom was headache observed in 55 patients (68.75%). In the study by Barone *et al* in 1970 headache was seen in 80% of cases whereas Ludwing *et al* in 1986 shown occurrence of headache in 38-86% of cases. In the present study out of 55 cases of headache 32 (58.3%) had generalized headache, 18 (32.7%) had frontal headache and only 5 (9%) had occipital headache. In the present study the duration of headache was less than 1 month in 19(33%) cases and more than 12 months in 13 (23.60%) cases. In the available references no one has mentioned about the type of headache and the duration of headache. Vomiting was the third commonest symptom observed in 37 patients (46.25%). In the study of Barone *et al* in 1970 vomitings were seen in 52% cases. Weakness was observed in 14 cases (17.5%), loss of consciousness in 13 cases (16.25%) and visual symptoms in 12 cases (15%). The visual symptoms were in the form of diplopia in 4 (33.33%), black outs in 8(66.66%) and diminished vision in 2 patients (16.66%) in the present study. Lowry *et al* in 1998, observed hemiplegia in 11.3% cases. In the present study hemiplegia was seen in 14 cases (17.5%). The other symptoms seen in the present study were loss of consciousness in 13 (16.25%) cases, abnormal behavior in 7(8.75%) cases, auditory symptoms in 5(6%) cases. Giddiness was in 4 (5%) cases, fever and speech difficulty in 2 (2.5%) each and walking difficulty in 1

(1.25%) case. In the present study aphasia was seen in 3% of cases where as Lowry *et al* 1998, found in 7% cases. In the present study extensor plantars and papilloedema were seen in 35% and 18% cases respectively. The incidence of papilloedema was 89% in the study of A. Asenjo *et al* 1951, 93% by Dastur H. M. *et al* 1965 and 42-55 % by Sibley *et al* 1956.

### Tuberculomas

In the present study 31 out of 34 (91.17%) cases were seen in cerebral hemisphere, with commonest being a parietal lobe 32.35%. Cerebellum and mid brain were also involved in 5.8% and 2.9% cases respectively. B.Rammurthi (1978), found that tuberculomas may occur in any part of the brain including the base of the brain and the brain stem. Commonly they occur in cerebral hemispheres, cerebellar lobes, cerebellopontine angle and along the base of the brain. Bhatia and Tandon (1988) have reported the incidence of seizures in 80% of cases. They also reported that the focal convulsions were seen in 80% of these patients and generalized convulsions in 20% cases only. This findings is in contract to our present study where the incidence of convulsions is 57% and generalized convulsions were seen in 87.8% of cases. In only 4 (7%) cases, partial seizures were seen. Hiller *et al* in 1980 have reported the incidence of tuberculoma as nil. Also most of the studies from developed countries have reported low incidence of tuberculoma and high incidence of glioma. Lowry *et al* has reported the incidence of tuberculoma as 1% whereas, the incidence of tuberculoma in the present study is 42.5%. Anderson J. M. *et al* 1976, found the incidence of hemiparesis in tuberculoma to be 38% Sibley *et al* 1956 found the incidence of papilloedema to be 42-55%.

### Neurocysticercosis

In the present study neurocysticercosis was seen commonly affecting the multiple lobes, 50% cases, with extensor plantars, motor weakness and cranial nerve involvement being the commoner signs in 80%, 50%, and 20% cases respectively. Byrd *et al* (1982) found that the clinical presentation of cysticercosis was not related to the age of the patient, but it does depend on the size, number and location of the cyst and the host response to the cyst. The patients with completely calcified lesions presented with seizure. Those with homogenously enhancing lesions presented with seizures and signs of a solitary brain mass. Seizures were the most common presentation and initial symptom of NCC. NCC has been described as an important cause of epilepsy in India. The incidence of seizures in NCC has been variably mentioned as between 22-94%. In our study the incidence of NCC was 12.5%. Such wide variation is probably due to different criteria used by different authors (A.

Mukherjee 1991). In India NCC should be entertained as a first possible cause in all cases of adult onset epilepsy (B. Maiti 1995).

### Primary brain tumours

In the present study out of 80 cases studied, 23 (28.75%) cases were of primary brain tumors. Out of these 13 (56.52%) were of glioma. Similarly Stephan and Israeli had reported the incidence of glioma between 55-60%. Our study also coincides with the study of Israeli. Meningioma was seen in 5 (21.7%) cases in our study. In the Minnesota cohort study headache was seen in 21% of cases, in our study it was seen in 54% of cases. Jennet K. Lowry in 1998 have reported the incidence of headache in 40%. In our study hemiparesis was seen in 5 (38.46%) cases, cranial nerve involvement in 3 (23.07%) and hemiplegia in 5 (38.46%) cases. The histopathological diagnosis was possible in only case, which was astrocytoma grade II, in other cases due to unavailability of neurosurgical facility in our hospital it was not possible. Most of these patients were referred to higher centre for further operative management.

### Brain abscess

Brain abscess presented with fever, headache, focal neurological deficit, altered sensorium and vomiting in all cases. Other clinical features like seizures, neck rigidity, ear discharge were also present. In our study 3 cases of brain abscess were noted. These cases presented mainly for altered level of consciousness. The presentation of brain abscess with headache and vomiting were accordance with the observation made by John Walton in 1994.

### Metastases

In the present study metastases were seen in 6 (7.5%) of cases. Out of these 6 cases, 4 (66.66%) were having primary tumor in lung and 1 case was diagnosed to have carcinoma endometrium. In 1 case primary tumor localization was not possible. These tumors prescribed mainly for headache in 4 (66.66%) cases and projectile vomiting in 3 (50%) cases.

### Investigations in cases of ICSOL

Investigations done were either for the confirmation of diagnosis or for detection of primary disease elsewhere.

### CT Profile in cases of ICSOL

In the present study, ring enhancing lesions were the commonest presentations on the CT scan seen in 44 (55%) cases, followed by diffuse lesions in 36(45%) cases and calcifications in 11(13.75%) cases. Multiple lesions on CT were commonly seen in the tuberculoma cases, followed by secondary's in brain.

### Other Investigations

As it is mentioned, the investigations done were either for the confirmation of diagnosis or for the detection of primary disease elsewhere. Accordingly, out of 34 tuberculoma cases 28 (82.4%) underwent chest X ray out of which 4 (11.8%) cases were having primary pulmonary tuberculosis. In only one case the brain biopsy was done which was proved to be astrocytoma grade II. In other cases brain biopsy was not possible because of lack of neurosurgical back up in our institution. In the only case of toxoplasmosis, antibody titer for toxoplasma was found positive, the same case was also positive for HIV.

### Cranial nerve involvement in ICSOL

In the present study cranial nerve involvement was seen in 12 (15%) cases. Out of these 12 cases tuberculoma was the cause in 5 (41.66%) cases. Out of these 5 cases 4 (80%) were having VI nerve and 1 case was having VII nerve involvement. In 2 (16.66%) cases NCC was the cause and brain abscess, toxoplasmosis was seen in 1 (8.33%) case each. All the VII nerve affections were supranuclear and VI nerve lesion was lower motor neuron type. In cases of tuberculoma the cranial nerve involvement was associated with hemiplegia in 3 (60%) cases. In 1 case of NCC it was associated with hemiplegia.

### Details of Hemiplegia cases

In the present study hemiplegia was seen in 14 (17.5%) cases. Out of these 14 cases, 5 (35%) cases were diagnosed as tuberculoma and 5 brain tumors and 1 (7.1%) case each of NCC secondaries, brain abscess, toxoplasmosis was seen. In 1 case with left hemiplegia, aphasia was seen. In the study by Jennet K. Lowry in 1998, hemiplegia was seen in 10.5% patients. Lis M. de Angeles have given the incidence of hemiplegia as 13%.

### Details of Abnormal cortical sensations

In three cases abnormal cortical sensations were seen and all these cases were of tuberculoma. In the present study all the three cases of abnormal cortical sensation were seen in tuberculomas and anatomically located to right parietal lobe. Abnormal cortical sensations like two point discriminations, agraphesthesia, tactile localization, tactile discrimination and tactile extinction were seen in all cases. None of these cases were associated with cranial nerve involvement, motor weakness or seizures.

### SUMMARY

The present prospective study on clinical and CT evaluation of cases of ICSOL was carried out in 80 cases of ICSOL suspected clinically, and confirmed on CT scan examination, in the Department of Medicine, Governemtn College and Hospital, Aurangabad. A detailed history was taken and was followed by complete neurological

examination. All cases were subjected to investigations of CT scan brain. Significant clinical and radiological findings were recorded and analyzed.

### Incidence

The commonest ICSOL in the present study was tuberculoma accounting for 42% of cases. The relative percentage of other ICSOL were neurocysticercosis 12.5%, abscess 3.75%, secondaries 7.5%, astrocytoma 6.25%, glioma 16.25%, meningioma 6.25%, epidermoid cyst 1.25% , arachnoid cyst 1.25%, acoustic neuroma 1.25%, toxoplasmosis 1.25%.

### Age and Sex

The maximum number of cases were distributed in 3<sup>rd</sup> and 4<sup>th</sup> decade (The age distribution varied from 12-81 years) Slight male preponderance was noted in the present study. There were 53 males and 37 females. The average sex ratio for male to female 1.16:1

### Clinical Features

The commonest presenting features were signs and symptoms of raised intracranial tension, such as convulsions (71%), headache (55%) of vomiting (47%). The other common presentations were motor weakness (17.5%), loss of consciousness (16.25%), visual symptoms (15%), abnormal behavior (8.75%), auditory symptoms (6.25%), fever (2.5%) and sensory symptoms (2.5%).

### Investigation CT scan Brain

The presentation, prognosis and treatment of ICSOL has changed radically with the increased availability of modern imaging techniques (computerized tomography).The computerized tomography is a non-invasive, reproducible and highly accurate method which demonstrates the size, location, configuration, extent and relationship with surrounding structure. It is possible in judge the consistency of the mass whether cystic or solid with the CT scan and also the exact density comparable to cerebrospinal fluid or brain tissue. Ventricular relationship is also easily studied. In CT evaluation of ICSOL valuable information may be gained when the scans are performed before and after administration of contrast material. With contrast enhancement the diagnostic yield of CT scanning increase.

### CONCLUSION

Thus, in the 80 cases of ICSOL studied in the present study, the age group commonly affected was between 20-40 years. The common ICSOL found was tuberculoma in 42.50% cases, followed by glioma in 16.25%, NCC in 12.5% and secondaries in 7.5% cases. Biopsy could be obtained in only one case which was diagnosed to have astrocytoma grade-II. Toxoplasmosis was seen in one case. The common symptoms found were

seizures (71.25%), headache (68.75%) and vomiting (46.25%). The common signs found were extensor plantars (30%), exaggerated DTR (21.25%) and motor weakness (18.75%).

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