

## **Imaging of Intracranial Space Occupying Lesions**

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### **Abstract**

**Background:** To study the imaging of intracranial space occupying lesions.

**Materials and Methods:** This prospective cohort study was conducted on 50 patients referred by various clinical departments with clinical suspicion of intracranial space occupying lesions, evaluated by computed tomography & magnetic resonance imaging. After taking informed consent, a detailed clinical history was recorded of each patient & relevant clinical examination was done.

**Result:** The main presenting symptoms were headache in 28 patients (56%), loss of consciousness in 16 patients (32%), 6 patients (12%) each were having seizure & vomiting. The most common clinical signs were altered sensorium in 22patients (44%), behavioural changes in 16patients (32%) & visual field defects in 12 patients (24%).

**Conclusion:** Intracranial space occupying lesions comprise of a diverse group of lesions. With the introduction of CT & MRI scanning, imaging of lesions has acquired a new dimension whereby excellent anatomical detail in axial, sagittal & coronal planes as well as lesion characterization has become possible.

**Keywords:** Brain, CT, Tumors

### **Introduction**

Distributions of tumor types vary substantially by age group and among the developing/developed countries. Data from several national cancer registries support differences in the epidemiology of brain tumors in children versus adults. High-grade glioma (30.5%) and meningioma (29.4%) are the most common types of adult primary brain tumors (data taken from the Swedish cancer registry). Males also generally have higher rates of primary malignant brain tumors while females have higher rates of non-malignant tumors, primary

meningiomas.<sup>1</sup> During the last few years, the role of magnetic resonance imaging (MRI) as a diagnostic tool in neuroradiology is well-established. With advanced MRI techniques such as perfusion, diffusion, and spectroscopy, it is now possible to differentiate between various intracranial lesions. The differential diagnosis of intra cerebral necrotic tumors and the cerebral abscess is frequently difficult on conventional MRI as both can present as ring enhancing lesions.<sup>2</sup> The necrotic component of brain tumor (glioblastoma multiforme [GBM] and metastases) show marked hypo intensity on diffusion-weighted image (DWI) due to increased free water. The DWI must allow differentiation between necrotic tumors and cerebral abscess.<sup>3</sup> The diffusion restricted signal helps in glioma grading on the basis of increasing tumor cellularity. Magnetic resonance spectroscopy (MRS) is highly sensitive in differentiating low-grade from high-grade gliomas, perilesional tumor infiltration and more specific in characterizing abscess with lipid/lactate, amino acid peaks. Provides additional information over conventional study to differentiate extra axial tumors as meningioma with alanine peak. Not only the common tumors are well-differentiated by MRI, but also space occupying lesions (SOL) of infective etiology, rare tumors, tumor mimicks as tumefactive demyelinating lesions and congenital lesions prevalence and imaging features are diagnosed by MRI.<sup>4</sup>

#### Materials and methods

This prospective cohort study was conducted on 50 patients referred by various clinical departments with clinical suspicion of intracranial space occupying lesions, evaluated by computed tomography & magnetic resonance imaging. After taking informed consent, a detailed clinical history was recorded of each patient & relevant clinical examination was done.

#### Inclusion criteria

- Presence of ICSOL on neuroimaging (CT/MRI).

#### Exclusion criteria

- Traumatic & non traumatic intracranial hematoma,
- Infarct & demyelinating lesions,
- Lesion size less than 2 cms
- Bony lesions of skull

#### Results

Out of total 50 patients enrolled for study most patients were in age range of 31 – 50 years & the mean age was 42.2 years. 31(62%) patients were male & 19 (38%) patients were females.

The main presenting symptoms were headache in 28 patients (56%), loss of consciousness in 16 patients (32%), 6 patients (12%) each were having seizure & vomiting. The most common clinical signs were altered sensorium in 22 patients (44%), behavioural changes in 16 patients (32%) & visual field defects in 12 patients (24%).

Solitary lesions were present in 35 patients (70%) & multiple lesions in 15 patients (30%). 70% lesions were supratentorial & 30 % infratentorial in location. Most common supratentorial location in adults was frontal lobe 40% followed by parietal lobe 30%. Most common supratentorial locations in children were frontal lobe. Infratentorially, cerebellum & posterior fossa were found to be most common location in adults & children respectively. Supratentorial lesions were most common both in adults & children. 60% lesions were intraaxial & 40 % extra axial in location. In adults, intraaxial lesions were more common than in children.

70% patients were having neoplastic lesions & 30 % patients had non-neoplastic lesions. Neoplastic lesions included metastases 20%, Astrocytomas 14%, Meningiomas 10%, Pituitary adenoma 10 %, Glial

tumors 6%, Schwannomas 4%, Hemangioblastomas 2%, Oligodendrogliomas 2% & Craniopharyngioma 2% whereas non-Neoplastic lesion included Arachnoid cysts 10%, Abscesses 8%, Hydatid cysts 6%, Tuberculoma 4% & Cavernoma 2%.

CECT was done in 40 patients, out of which majority (60%) was having hypodense lesions & most common associated finding was mass effect (80%). CECT was done in 10 patients out of which 8 patients (80%) were having ring like pattern of enhancement. Unenhanced MRI, was done in 50 patients and majority of the lesions appeared hypointense on T1WI (70%), hyperintense on T2WI (70%) & hyperintense on FLAIR (30%) sequences with mass effect (70%) as most common associated findings.

### Discussion

The term ICSOL is generally used to identify any lesion whether neoplastic or inflammatory in origin which increases the volume of intracranial contents & leads to a rise in intracranial tension (ICT). The presentation of ICSOL has changed radically with increased availability of modern imaging techniques like CT & MRI. The age ranges from 1-90 yrs in present study. The peak incidence was in 5th decade followed by 3rd decade with male predominance was correlated with Madan AH et al study<sup>5</sup>.

In most of the cases in our study, more than one symptoms & signs were present. The commonest symptom was headache 56%. The similar observation was seen in study by Benjarge PV & Kulkarni<sup>6</sup> in which 55 patients had headache out of 80 patients and by Mahmoud MZ<sup>7</sup> in which 43% patients presented with headache. The second most common presenting complaint in our study was loss of consciousness in 32% whereas 16.2% & 14% patients in Benjarge PV &

Kulkarni A<sup>6</sup> & Mollah N et al study<sup>8</sup> respectively had similar complaints. In our study, 12% patients were having seizure & vomiting. Seizures & vomiting were the third commonest symptom observed in 46.25% out of 80 patients in Benjarge PV & Kulkarni A study<sup>6</sup> whereas Mollah N et al found vomiting in 52% & seizures in 36%.<sup>8</sup>

The most common clinical signs were altered sensorium in 44% which was high as compared to Mollah N et al study<sup>8</sup>, only 6% had altered sensorium. The second most common presenting sign in our study was behavioural changes in 32%, which was high as compared to Benjarge PV & Kulkarni A study<sup>6</sup> abnormal behaviour was observed in 8.75% cases.

In our study, 70% lesions were supratentorial & 30% infratentorial in location, which were corresponding to study by Chander R et al<sup>9</sup>, having 79% supratentorial & 21% infratentorial lesions. Supratentorial was most common location both for adults & children.

### Conclusion

Intracranial space occupying lesions comprise of a diverse group of lesions. With the introduction of CT & MRI scanning, imaging of lesions has acquired a new dimension whereby excellent anatomical detail in axial, sagittal & coronal planes as well as lesion characterization has become possible.

**Ethical approval:** The study was approved by the Institutional Ethics Committee

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