

MULTISLICE COMPUTED TOMOGRAPHIC EVALUATION OF INTRACRANIAL SPACE OCCUPYING LESIONS

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ABSTRACT: Introduction: The term intracranial space occupying lesions includes lesions which expand in volume to displace normal neural structures. They give rise to the various symptoms like focal seizures, paralysis, features of raised intracranial tension and false localizing signs. **AIMS & OBJECTIVES:** To determine the role of computed tomography in evaluation of space occupying lesions of brain, assessment of the site, nature and extent, age and sex prevalence of space occupying lesions. **MATERIAL & METHODS:** The present study was conducted on one hundred patients with space occupying lesions of the brain presenting with various neurologic symptoms or incidental findings. Patients of all age groups suspected to have intracranial space occupying lesions were included in the study. Results were expressed as mean \pm SD and proportions as percentages. Results: Most of the cases of hyperdense lesions were intracerebral hemorrhages, meningioma, lymphoma and medulloblastoma. High grade astrocytomas were heterogenous hypodense lesions with irregular ring enhancement associated perilesional edema and mass effect. Low grade astrocytomas had minimal rim/ mural nodule enhancement. Intracranial tuberculoma and neurocysticercosis showed ring with nodular enhancing. Calcification was seen in tuberous sclerosis, neurocysticercosis, meningiomas, oligodendrogliomas, arteriovenous malformations and dermoid cyst. Congenital lesions had variable presentation ranging from cystic to mixed pattern lesions. **CONCLUSIONS:** In developing countries, CT imaging remains as a major diagnostic modality, with easy accessibility and technical ease as compared to MRI.

KEYWORDS: MDCT, Brain, Space Occupying lesions.

INTRODUCTION: Multislice Computed Tomography (CT) was introduced in 1992 with the advent of dual-section capable scanners and was improved in 1998 following the development of quad-section technology. The various space occupying lesions of the brain are classified as follows.¹

1. Tumors – benign and malignant.
2. Traumatic – contusion, intracerebral hematoma, arterial dissection.
3. Vascular – aneurysms, arteriovenous malformations.
4. Infective: brain abscesses by various microbes, granulomatous infection by mycobacterium, treponema, fungal infection by aspergillosis, candida, cryptococcus etc. parasitic infection by cysticercosis, toxoplasma, echinococcus.
5. Congenital lesions.

Tumors:

1. Gliomas (a) Astrocytomas: Circumscribed-juvenile pilocytic astrocytoma, pleomorphic xanthocytoma, subependymal giant cell astrocytoma, diffuse, optic pathway glioma, anaplastic

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- astrocytoma, glioblastoma multiforme (b) Oligodendrogliomas (c) Ependymomas (d) Choroid plexus tumors - papilloma or carcinoma.
2. Non-glial tumors: (a) Neuronal and mixed neuronal/glial tumors: Ganglioglioma, Gangliocytoma, Central neurocytoma. (b) Pineal parenchymal tumors: Pineoblastoma, Pineocytoma (c) Embryonal Tumors: Medulloblastoma
 3. Tumors of cranial nerves (a) Schwannoma (b) Neurofibroma (c) Malignant peripheral nerve sheath tumors.
 4. Tumors of the meninges: (a) Meningioma (b) Melanocytic tumor (c) Hemangioblastoma.
 5. Tumors of hematopoietic system (a) Primary or secondary CNS lymphoma (b) Granulocytic sarcoma.
 6. Germ cell tumor: (a) Germinoma (b) Teratoma.
 7. Tumors of the Sellar region: (a) Pituitary adenoma (b) Craniopharyngioma (c) Rathke cleft cyst.
 8. Metastases

Cystic lesions of Brain:²

1. Normal and/or variant - Choroid plexus cyst (xanthogranuloma), enlarged perivascular spaces, ependymal, neuroglial.
2. Congenital - Arachnoid, colloid, epidermoid, dermoid, neurenteric, Rathke cleft.
3. Traumatic and/or vascular infectious - neurocysticercosis, hydatid cyst.
4. Tumor-associated nonneoplastic - Meningioma, schwannoma, pituitary adenoma, Craniopharyngioma.

AIMS AND OBJECTIVES:

1. To determine the role of computed tomography in evaluation of space occupying lesions of the brain.
2. Assessment of the site, nature and extent of these space occupying lesions.
3. Assessment of age and sex prevalence of these space occupying lesions.

MATERIAL AND METHODS: The present study was conducted on hundred patients in the Department of Radiodiagnosis. Cases with space occupying lesions of the brain presenting with neurologic symptoms or incidental findings were selected for the study. Inclusion criteria: Patients ranging from all age groups who are clinically suspected to have intracranial space occupying lesions were included in the study. Exclusion criteria: Trauma, Pregnant females, allergy to contrast.

Philips Brilliance multislice (six slice) whole body scanner was used with slice thickness of 6 mm, Matrix size: 640 x 640, Current 400 mAs, Voltage 120 KVP and a Gantry tilt of 15-20°. Statistical analysis: Results were expressed as mean \pm SD and proportions as percentages.

RESULTS: The space occupying lesions of the brain were broadly classified into two groups. 79% were in supratentorial compartment, 64% were intra-axial and 15% were extra-axial. 21% were seen in infratentorial compartment, 15% were intra-axial and 6% were extra-axial. Table I shows that the age range of patients was found from 2 to 80 years.

Peak incidence was observed in the age group of 21-30 years (18 cases) followed by 11-20 years (17 cases). Table II shows that 58% were males and 42% were females. Male to female ratio

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was found to be 1.4:1. The commonest complaint of the cases was headache seen in 46% cases. Hyperdense lesions were the most common finding on non-contrast CT studies, seen in 45% cases, hypodense lesions in 40% and isodense lesions in 15% cases. Out of 79 supratentorial lesions, well defined hyperdense lesions were seen in 35 cases (44.3%). Well defined hypodense lesions were seen in 26 cases (32.9%) and ill-defined hypodense lesions were seen in 6 cases (7.6%). Well defined isodense lesions were seen in 7 cases (8.8%) lesions and irregularly defined isodense lesions were seen in 5 cases (6.3%). About 58 cases (73.4%) showed a mass effect, perilesional edema was seen in 41 cases (51.8%), calcification in 15 cases (18.9%) and bone changes in 14 cases (17.7%). Ring-enhancement of supratentorial lesions was the most common pattern of contrast enhanced studies seen in 23 cases (38.9%). Homogenously enhancing lesions were seen in 11 cases (18.6%) and heterogenously enhancing lesions were seen in 8 cases (13.5%).

No enhancement was seen in 3 lesions (5%) and rim enhancement of the lesion was seen in 2 cases (3.4%). Out of 21 infratentorial lesions, well defined hyperdense lesions were seen in 10 cases (47.6%) followed by well-defined hypodense lesions in 8 cases (38%) and well defined isodense in 3 cases (15.7%) lesions. About 15 cases (71.4%) showed a mass effect with perilesional edema in 12 cases (57.4%), bone changes in 2 cases (9.5%) and calcification in 1 case (4.7%). Homogeneously enhancing infratentorial lesions were seen in 7 cases (11.8%) while ring enhancing lesions were seen in 3 cases (5%). Rim and mural nodule enhancement was seen in 2 lesions (3.4%). Table III shows that among congenital lesions, there was one case of mega cistern magna, two cases of arachnoid cysts and two cases of dermoid/epidermoid cysts [Figure.1a, b, d] one case of tuberous sclerosis and Dandy Walker malformation each [Figure 2a, b].

Among vascular lesions, there were seventeen cases of acute ICH, three cases of arteriovenous malformation, three cases of acute SDH, two cases of subacute SDH and three cases of chronic SDH [Figure 3a-d].

Among infectious lesions, there were nine cases of tuberculomas, six cases of abscesses [Figure 4a, b] and twelve cases of neurocysticercosis [Figure 5a, b].

Among tumors and tumor like lesions, there were four cases of low grade astrocytomas and six cases of high grade astrocytomas [Figure.6a, b] and, four cases of Sellar region masses [Figure 7a, b] five cases of meningioma [Figure 7c, d] three cases of Oligodendroglioma, two cases of schwannomas [Figure 8a, b], one case of Ependymoma, one case of medulloblastoma [Figure 7c, d] nine cases of metastases [Figure 7a-d], two cases of colloid cysts [Figure 1c] and one case of lymphoma:

1. Most of the cases of hyperdense lesions (27%) showed blood attenuation, suggestive of intracerebral and subdural hemorrhages. 5 cases of meningioma and a case of lymphoma and medulloblastoma were also hyperdense.
2. Hypodense lesions with heterogenous/ring enhancement, irregular margins, associated perilesional edema and mass effect in the older age group were suggestive of high grade astrocytomas seen in 6 cases (6%) in the present series. Low grade astrocytomas with minimal/rim and mural nodule enhancement were seen in 4 cases (4%).
3. The majority of the lesions, i.e. 26 cases (44%) showed ring enhancement on contrast enhanced study done in 59 cases. Homogenous enhancement was seen in 18 cases (30.5%), while heterogenous enhancement was seen in 8 cases (13.5%). No enhancement was seen in 3 cases, two arachnoid cysts and a low grade glioma.

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4. Ring enhancing or nodular enhancing hyperdense or isodense lesions suggestive of intracranial tuberculoma were seen in 9 cases. Headache and seizures were the most common complaint in these patients. Most of the lesions were located supratentorially.
5. Hypodense lesions with ring enhancement and scolex were seen in 7 out of 12 cases of neurocysticercosis with seizures as presenting complaint in most of the cases. 6 cases of hypodense lesions with ring enhancement, medial wall being thinner, perilesional edema and fever/ history of infection were suggestive of brain abscesses.
6. Calcification was seen in tuberous sclerosis, neurocysticercosis, meningiomas, oligodendrogliomas, arteriovenous malformations and dermoid cyst.
7. Incidental note was made of a case of tuberous sclerosis and Dandy Walker malformation.

DISCUSSION: In the present study, out of 100 cases, supratentorial lesions were seen in 79 cases (79%) and infratentorial lesions were seen in 21 cases (21%). This corresponds to the study carried out by Irfan A et al³ on 386 cases in which 77% were supratentorial lesions and 23% were infratentorial and another study conducted by Alabedeen⁴ on 192 cases in which 76.6% were supratentorial lesions and 23.4% were infratentorial.

In the present study, the age ranged from 2 to 80 years. The Mean age + SD were 36.8+ 19.3 years. The age incidence of our study corresponds with the study carried out by Irfan A et al³ where mean age was 33 years and in another study carried out by Alabedeen Z et al⁴, the mean age was 34.1. In the present study most of the cases (35%) were in the age group 11 to 30 years and this also corresponds with the maximum age incidence in the study carried out by Irfan A et al³, which was a second and third decade.

In the present study, out of the 100 cases, 58 cases were male and 42 cases were female with male to female ratio of 1.4: 1 corresponding with the study done by Irfan A et al³ where male to female ratio of 1.5:1 and Mahmoud⁵ who reported male to female ratio of 1.7:1.

In the present study, headache was the most common clinical presentation seen in 46% cases, altered sensorium in 24% cases, focal neurological deficit in 19% cases, seizures in 15% cases and fever in 15% cases. Our study corresponds with the study conducted by Mahmoud⁵ in which headache was seen in 43% cases, altered sensorium in 21% cases, focal neurological deficit in 14% cases and seizures in 11% cases.

Out of 45 hyperdense lesions, 35 were supratentorial and 10 were infratentorial in location. Thirteen hyperdense intra-axial lesions showing attenuation value corresponding to blood with perilesional edema and mass effect in the form of effacement of lateral ventricle and midline shift were intracerebral hemorrhages. Eight extra-axial lesions with crescentic shape had features of subdural hemorrhage. Most patients with intracerebral hemorrhage were of older age group with hypertension being the commonest risk factor in 70% cases. In 3% of all cases, arteriovenous malformation related hemorrhage was seen in young males. These findings are in accordance with a study done by Chiewvit et al⁶ in 131 cases with non-traumatic hemorrhage in which hypertensive bleed was present in 59.5% cases and arteriovenous malformations were seen in 2.4% cases.

In older individuals who were known cases of primary carcinoma elsewhere, isodense (5 cases) or slightly hyperdense (3 cases) lesions were seen which showed ring enhancement in 5 cases and homogenous enhancement in 3 cases with massive edema, so metastasis to the brain was suspected. Multiple hyperdense lesions on non-contrast study were seen in known cases of renal

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carcinoma, so hemorrhagic metastasis was the first possibility. The age incidence and CT findings in the present study corresponds to that of Deck et al⁷ done in 122 cases where most of the lesions (80%) were supratentorial, present in older age groups and appeared as well defined hyper/ Iso/ hypodense lesions at corticomedullary junction, surrounded by extensive perilesional edema. CT findings of metastatic lesions in the present study also correspond to the study done by Pott DG, et al⁸ done in 343 cases where multiple iso to hyperdense lesions were seen with massive edema in most of them.

In the present study, intracranial tuberculomas was the probable diagnosis in 3 cases with hyperdense lesions and 6 cases with isodense lesions presenting with headache and fever, whose Mantoux test was positive. 6 cases showed a ring enhancing pattern while 3 cases showed nodular enhancement. Perilesional edema was noted in 6 cases. 7 cases were located supratentorially while two were located infratentorially. No calcified lesion was seen. These findings correlate with a study done on tuberculomas by Bhargava et al⁹ done in 25 cases where most of the lesions were supratentorial. In the present study also, 80% of lesions were supratentorial. The present study also corresponds with the study done by Whelan MA, et al¹⁰ including 80 cases in which lesions were either isodense or hyperdense, and none were calcified.

Five hyperdense extra-axial lesions appeared as well marginated, homogenous, dural based masses, four located supratentorially and one at the cerebellopontine angle, causing buckling of white matter having high attenuation and strong contrast enhancement. Calcification was seen in three cases (60% of all cases), perilesional edema in four cases (80% of all cases) and hyperostosis in two cases (40% of all cases), so with them the probable diagnosis was meningioma.

These findings correlate with a study done by Kendall B, et al¹¹ in which 90% lesions were hyperdense and showed intense enhancement. The above features of meningiomas also correspond with the study done by Amundsen et al¹² in which 72.2% lesions were hyperdense, 93.7% showed strong homogenous enhancement, calcification was seen in 45%, perilesional edema in 80.9% and hyperostosis in 23-44%.

Two hyperdense well defined round to oval masses in third ventricle were colloid cysts. Colloid cysts appear as homogenous, rounded, hyperdense masses at the foramen of Monro showing minimal contrast enhancement. In the present study, CT features corresponded well with features described by Ganti et al.¹³

One hyperdense infratentorial lesion with homogenous enhancement, present in midline in 11 year male was considered to be medulloblastoma. Koeller et al¹⁴ in their study stated that medulloblastomas are primarily childhood tumors, appearing as hyperdense lesions pushing fourth ventricle anteriorly and surrounded by cerebrospinal fluid with moderate enhancement. Zimmerman et al¹⁵ reported similar findings in their study on medulloblastoma.

One elderly immunocompromised patient with homogeneously enhancing hyperdense mass involving both frontal lobes had features of lymphoma. On CT, the lesion typically had high attenuation and virtually showed enhancement after administration of contrast material. The findings in the present study corresponds with that done by Jack Jr, et al¹⁶ on 32 cases of intracranial lymphomas in which 63% lesions were hyperdense and 100% showed homogenous enhancement.

Six hypodense supratentorial lesions in adults had ill-defined margins involving the white matter with heterogenous enhancement in 4 cases and ring enhancement in 2 cases showing mass effect and perilesional edema with areas of hemorrhage appearing as probable cases of high grade

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astrocytomas. The above morphological CT appearance and enhancement pattern parallels to the features observed by Rees et al.¹⁷ Two cases who presented with headache had well defined hypodense lesions with one of them showing mild enhancement and the other showing no enhancement, appearing as probable cases of low grade astrocytomas. T Chang, et al¹⁸ in their study of 56 cases of supratentorial gliomas stated the same that low grade gliomas appear as well-defined hypodense masses with little or no enhancement and high grade gliomas appear as ill-defined masses with a ring or heterogenous enhancement.

Two cases in children showed rim enhancing infratentorial hypodense lesion with a solid enhancing mural nodule. These features were probably due to pilocytic astrocytoma. Koeller et al¹⁹ showed similar findings in their study, in which pilocytic astrocytomas appeared as homogenous hypodense masses with an isodense enhancing mural nodule. An isodense fourth intraventricular lesion in a male child with homogeneous enhancement was seen, which was a probable case of Ependymoma. These features were in accordance with the study done by Swartz et al²⁰ where enhancing isodense lesions were seen in 80%.

Four lesions were seen in sellar and parasellar region. Two Sellar lesions were seen in adult females with mass effect as compression of pituitary gland and extending in the suprasellar region with figure of eight appearances in one of them. They had features of pituitary macroadenoma probably, similar to that described by Daniel et al.²¹ Two hypodense lesions with calcification and rim enhancement were seen causing a widening of Sella, so Craniopharyngioma was the probable cause. These features were similar to the features described by Harwood.²²

Three supratentorial hypodense lesions, with frontal location, calcification and heterogenous enhancement and calvarial erosion had features similar to oligodendrogliomas. No associated cyst or hemorrhage was seen. The CT features in the present study corresponds with the study done by Lee et al²³ in which 61% of gliomas were frontal in location, 55.5% were hypodense, 44.4% showed contrast enhancement, 38.9% showed calcification, only 22.2% had associated cysts and 19.4% had hemorrhage.

Two infratentorial hypodense homogeneously enhancing lesions were seen in the cerebellopontine angle, causing a widening of internal auditory meatus, so schwannoma was as the most probable diagnosis. They were well defined, encapsulated, affecting the vestibulocochlear nerve. Naidich et al²⁴ in their study on schwannomas showed similar characteristics.

Seven cases who presented with seizures had ring enhancing lesions with hyperdense focus suggestive of scolex with perilesional edema were of neurocysticercosis. Five cases of adult age group presented with calcified lesions and seizures, so stage IV calcified neurocysticercosis was the most common possibility. In the present study, most of the lesions were multiple and had appearances as seen by Carbajal et al²⁵ in their study of 232 cases of neurocysticercosis.

Six cases with ring enhancing lesions presented with fever and altered sensorium, so a possibility of brain abscess was put in them correlating them with clinicobiochemical findings. On CT, they appeared as well defined hypodense mass with thin medial walls, strong contrast enhancement and perilesional edema. Above CT features were consistent with the features of cerebral abscess observed by Kaufmann et al.²⁶ However, these could be confused with metastasis, granulomatous infection and gliomas, so clinical correlation is important.

A hypodense lesion with fat attenuation and calcification was seen in the midline, with features like dermoid as described by Lunardi et al.²⁷ Another well marginated, irregular, CSF density

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lesion in cerebellopontine angle had features similar to that of epidermoid cyst. These features correspond to that observed by Davis et al.²⁸

Two extra-axial non-enhancing hypodense lesions seen in temporal region, one of them, causing remodeling of bone, had features like that of arachnoid cysts which correspond to the features observed by Kollias et al.²⁹ who stated that arachnoid cysts constitute 1% of all space occupying lesions, appearing as well defined, regular extra-axial mass of CSF density, showing no contrast enhancement and don't communicate with arachnoid space.

A case of Dandy Walker malformation was seen in a 2 year old girl child with enlargement of the head and posterior fossa with hydrocephalus, cerebellar dysgenesis and vermian hypoplasia. These findings match with the study done by Hirsch JF et al.³⁰

A male child presented with seizures and skin manifestations in who calcified tubers were seen. This corresponds with the study done by Altman NR³¹ on 26 patients with tuberous sclerosis, which showed that 88% of lesions were calcified.

Age Group (Years)	Supratentorial (No. of cases)	Infratentorial (No. of cases)	Total
0-10	4	3	7
11-20	13	4	17
21-30	16	2	18
31-40	11	2	13
41-50	12	3	15
51-60	11	4	15
>60	12	3	15
Total	79	21	100

TABLE I: AGE DISTRIBUTION (n=100)

Sex	Total	Percentage
Male	58	58%
Female	42	42%
Total	100	100%

TABLE II: SEX WISE DISTRIBUTION (n=100)

CT Diagnosis	No. of cases	Percentage
Congenital (7 cases)		
Arachnoid cysts	2	2%
Tuberous sclerosis	1	1%
Dandy Walker Malformation	1	1%
Mega cistern magna	1	1%
Dermoid/Epidermoid cysts	2	2%

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Vascular (28 cases)		
Acute ICH	17	17%
Arteriovenous Malformation	3	3%
Acute SDH	3	3%
Chronic SDH	3	3%
Subacute SDH	2	2%
Infective (27 cases)		
Neurocysticercosis	12	12%
Tuberculomas	9	9%
Abscesses	6	6%
Tumor and tumor like lesions (38 cases)		
Glioma		
High grade astrocytomas	6	6%
Low grade astrocytomas	4	4%
Oligodendroglioma	3	3%
Ependymoma	1	1%
Metastasis	9	9%
Meningioma	5	5%
Sellar region masses	4	4%
Schwannoma	2	2%
Colloid cysts	2	2%
Medulloblastoma	1	1%
Lymphoma	1	1%

TABLE III: PROBABLE CT DIAGNOSIS OF SPACE OCCUPYING LESIONS OF BRAIN (n=100)

CONCLUSION: In India, where the cost and accessibility are the prime factors in determining the modality to be used for diagnostic purposes. CT scan is accessible as a potent diagnostic tool throughout the country. The technical ease, speed and patient comfort are much more in CT as compared to MRI. When the cost benefit is evaluated, CT imaging remains as a major diagnostic modality in our country, within the reach of common man.

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CONGENITAL LESIONS

Figure 1: (a) NCCT Brain Axial scan showing increased subarchnoid space in posterior fossa with endosteal scalloping, vermis and cerebellar hemispheres are intact- Mega cistern magna. (b) Axial scan NCCT brain showing a well-defined extra-axial hypodense lesion with CSF density in the temporal region- Arachnoid cyst (c) Axial NCCT brain showing a hyperdense lesion in cavum septum pellucidum, at the level of the foramen of Monro- colloid cyst (d) Axial scan NCCT brain showing a well-defined midline fat attenuation lesion with calcification at the margin in frontobasal region - Dermoid cyst.

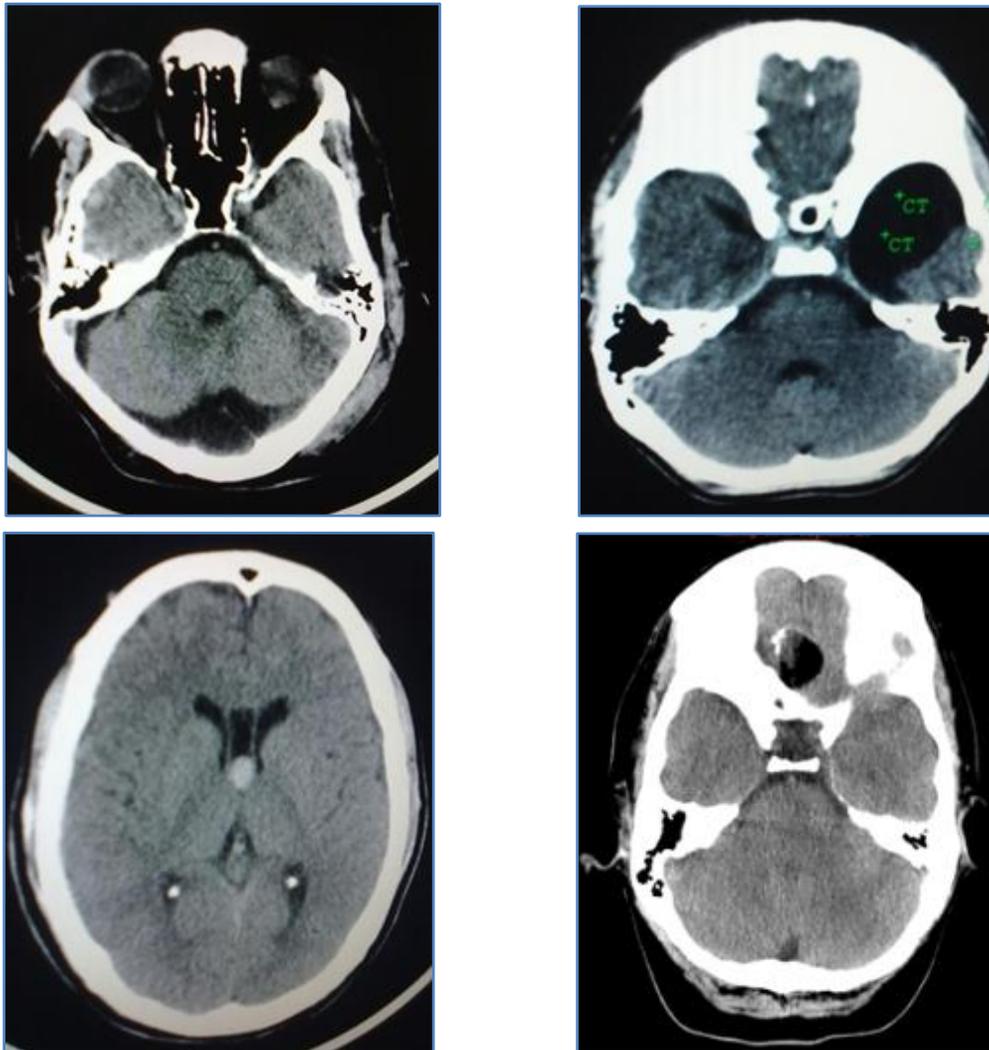


Fig. 1

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Figure 2: (a) Axial scans NCCT brain showing a large posterior fossa cystic lesion with a bony defect in occipital bone, marked dilatation of the ventricular system and hypoplastic vermis and cerebellar hemispheres-Dandy Walker malformation (b) Axial NCCT brain showing calcified lesions in bilateral periventricular, subependymal regions and left caudate nucleus suggestive of calcified tubers.

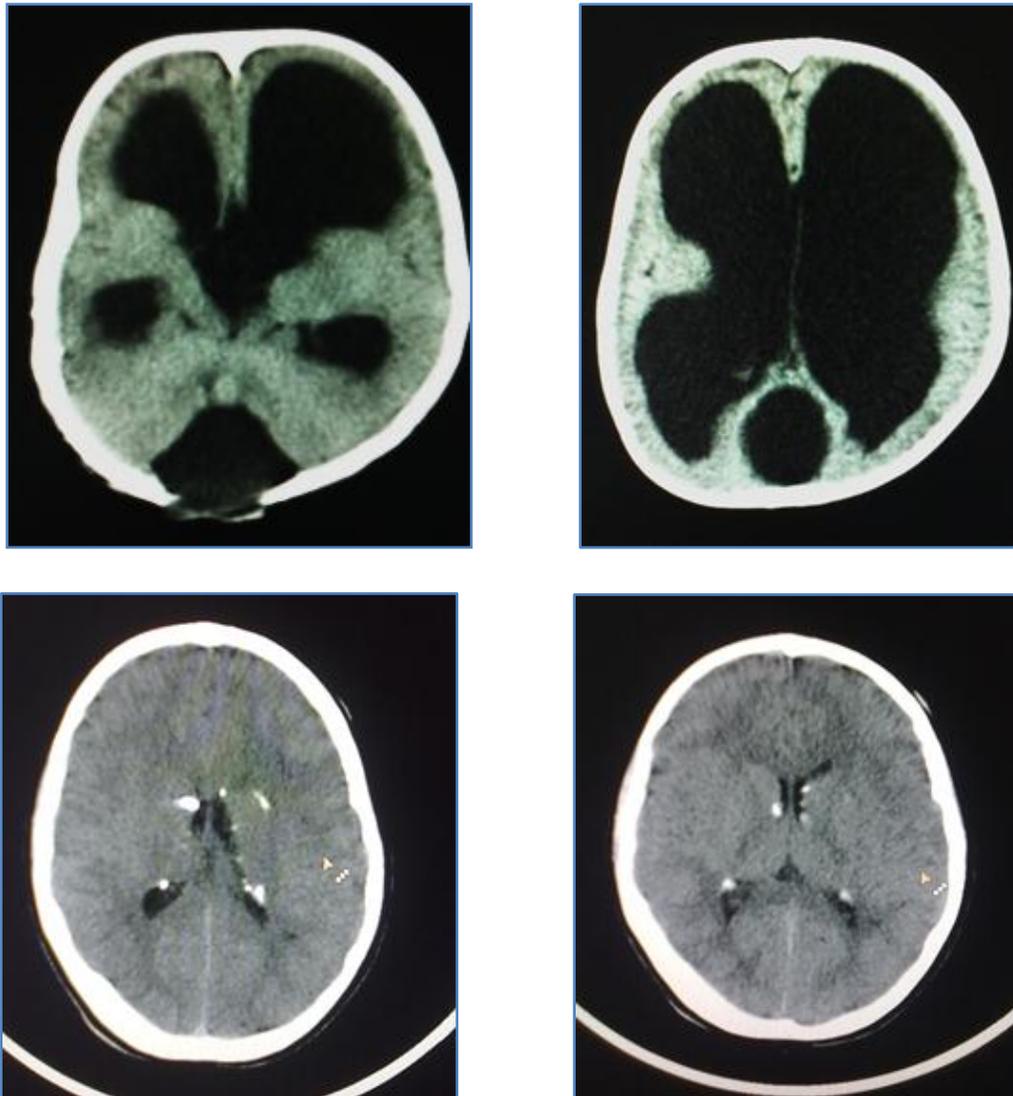
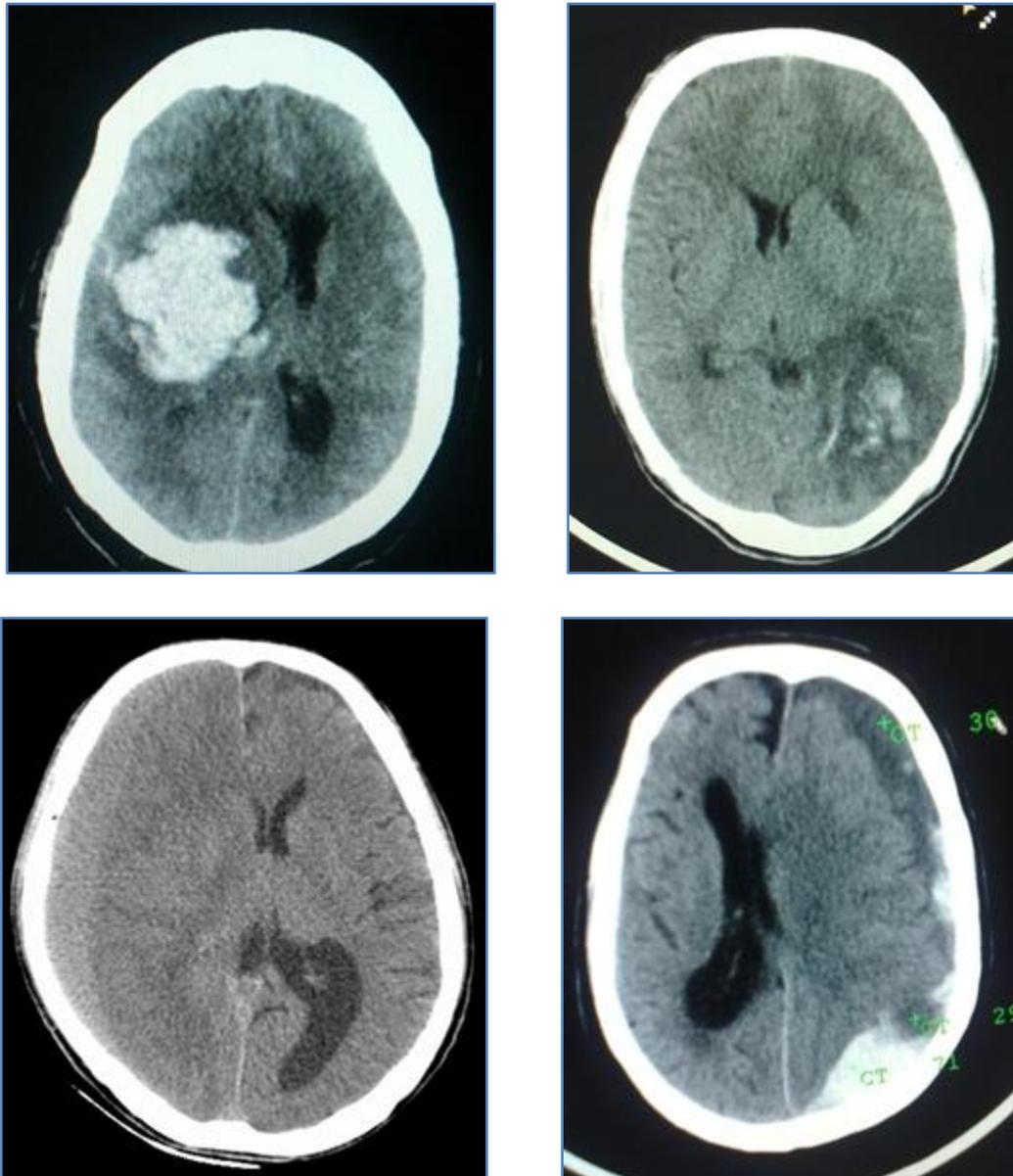


Fig. 2

CRANIAL HAEMORRHAGES:

Figure 3: (a) Axial NCCT brain showing hyperdense lesion having blood attenuation with perilesional edema in the right gangliocapsular region-Hypertensive Bleed. Significant midline shift is noted towards contralateral side (b) Axial NCCT brain showing hyperdense linear lesions with associated intracerebral hemorrhage and edema- arteriovenous malformation related hemorrhage (c) Axial NCCT brain showing a crescentic shaped extra-axial lesion showing mass effect-subacute subdural hemorrhage (d) Axial NCCT brain showing a large extra-axial crescentic lesion with mixed attenuation, suggestive of acute on chronic subdural hemorrhage associated with subfalcine herniation.

**Fig. 3**

INFECTIVE LESIONS:

Figure 4: (a) Axial CECT brain showing multiple hypodense lesions showing ring enhancement with thinner medial walls in a patient with otomastoiditis- brain abscesses (b) Axial CECT brain showing multiple ring enhancing lesions in both cerebellar regions and perilesional edema, likely tuberculomas.

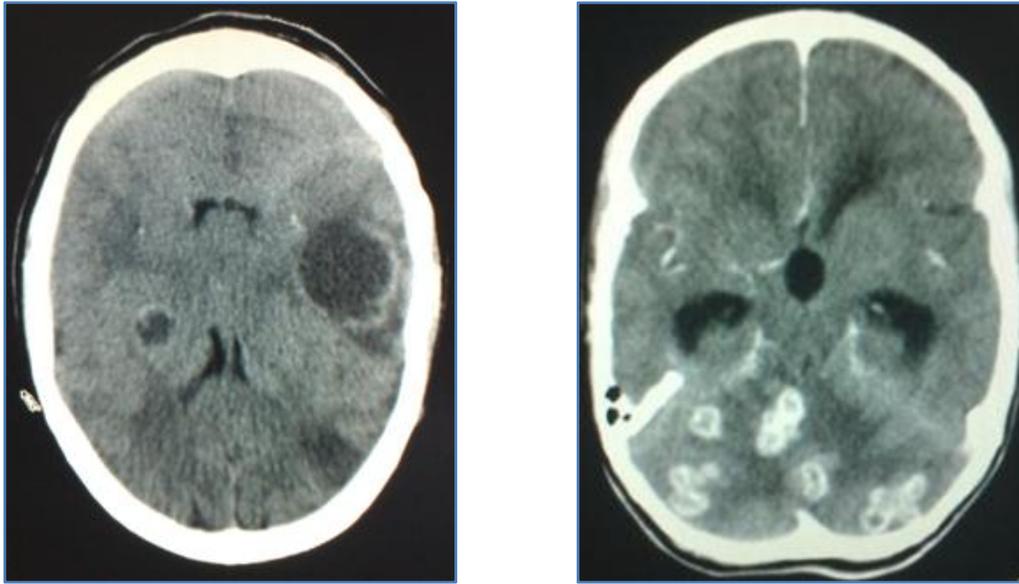
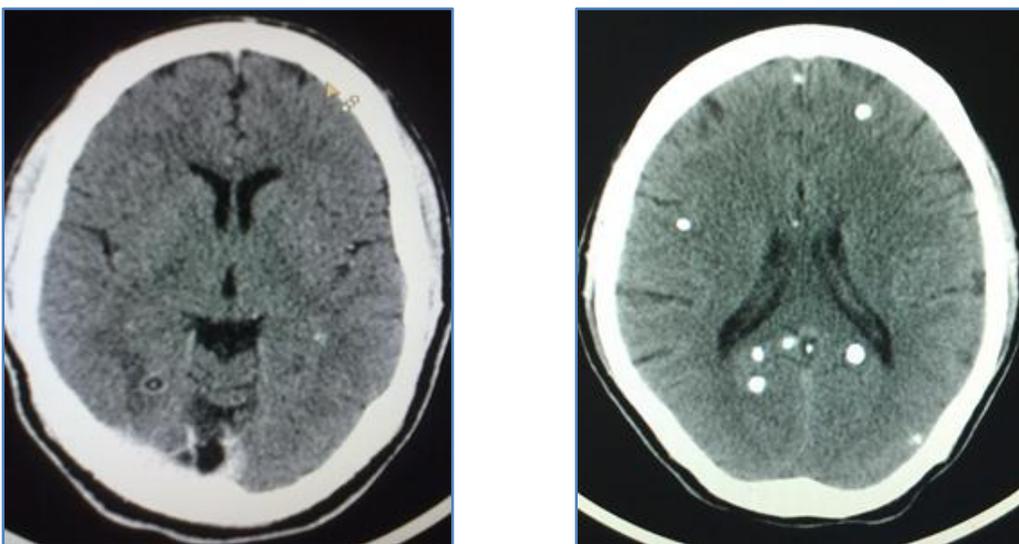
**Fig. 4**

Figure 5: (a) Axial CECT brain showing hypodense lesion in the occipital region showing ring enhancement with the enhancing eccentric speck s/o scolex-Vesicular stage of neurocysticercosis. (b) Axial NCCT brain showing multiple scattered calcified lesions in both hemispheres- Calcific stage of neurocysticercosis.

**Fig. 5**

ORIGINAL ARTICLE

SUPRATENTORIAL TUMOURS:

Figure 6: (a) Axial CECT brain showing a well-defined hypodense non-enhancing lesion in fronto-parietal region with minimal mass effect-Low grade astrocytoma. (b) Axial CECT brain showing a large ill-defined hypodense intra-axial lesion in left temporoparietal regions with increased peripheral and central vascularity with perilesional edema -High grade astrocytoma.

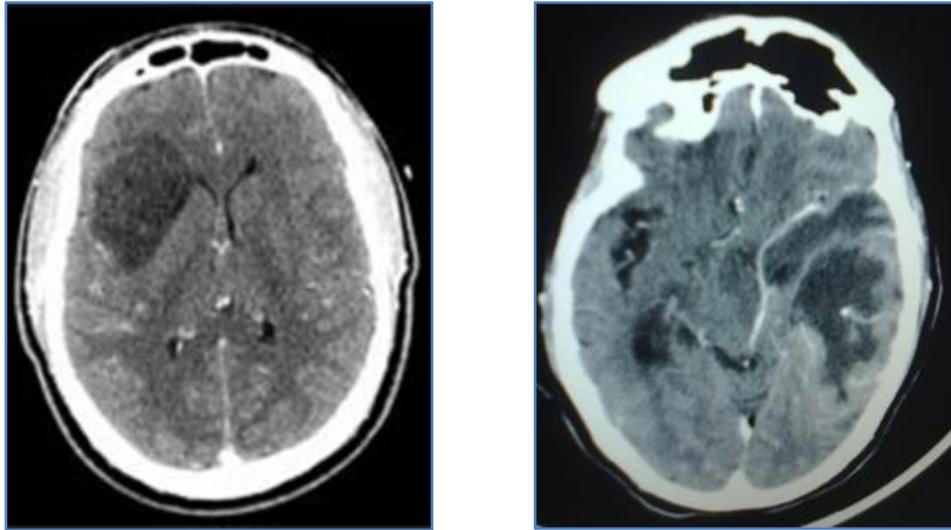
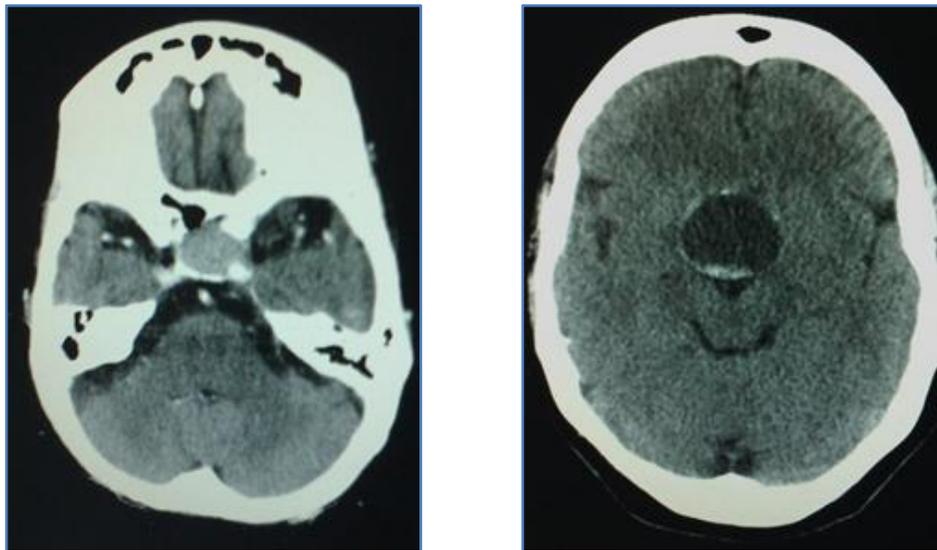


Fig. 6

Figure 7: (a) Axial CECT brain showing a lobulated homogeneously enhancing Sellar mass with parasellar extension causing remodelling of the brain-Pituitary Macroadenoma (b) Axial NCCT brain showing a hypodense suprasellar lesion with peripheral calcification with minimal rim enhancement-Craniopharyngioma (c, d) Axial NCCT and CECT brain showing a large homogeneously enhancing hyperdense mass situated in the midline extending into both frontal lobes with mass effect-Meningioma.



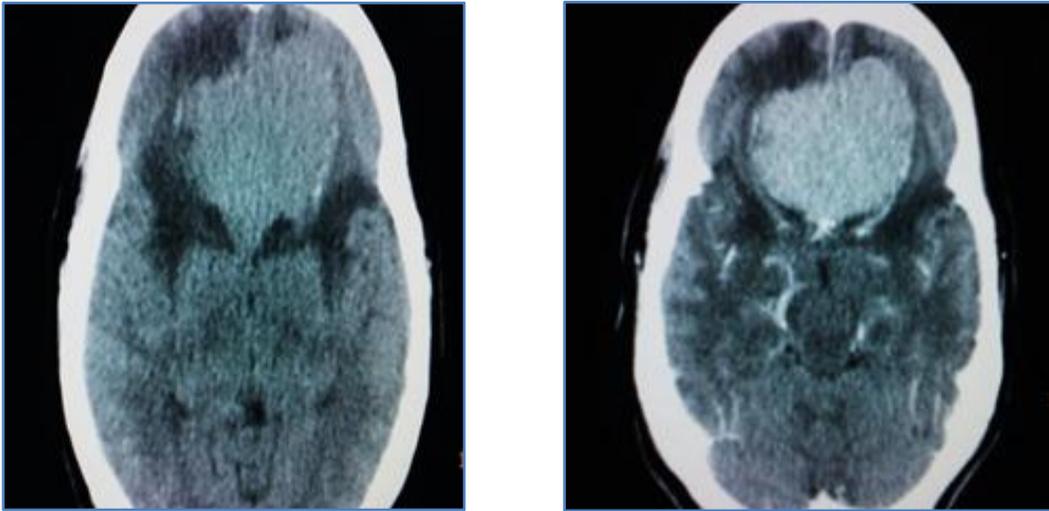
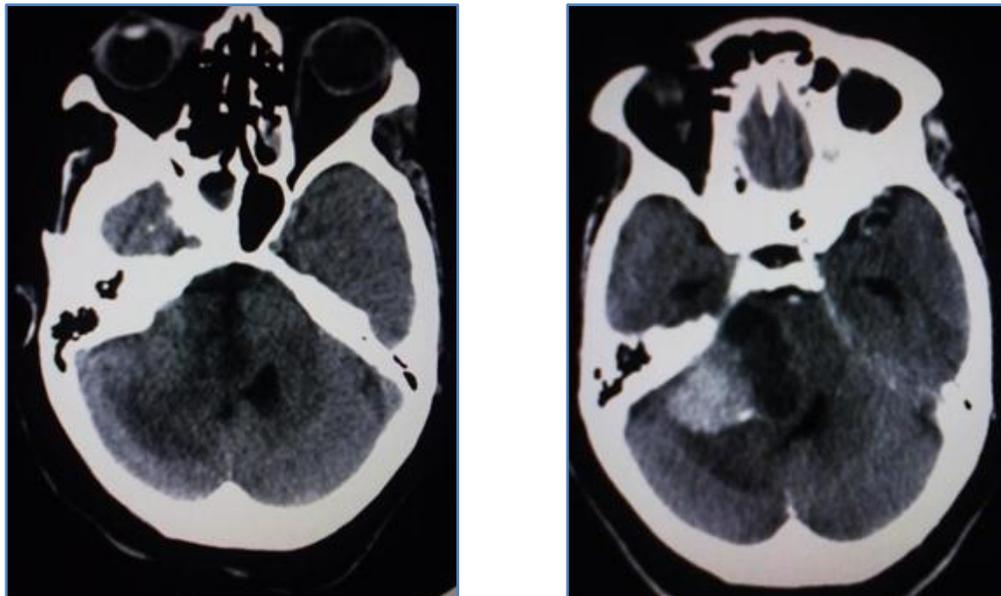


Fig. 7

INFRATENTORIAL TUMOURS

Figure 8: (a, b) Axial NCCT & CECT Brain showing an ill defined hypodense lesion in right cerebello pontine angle with perilesional edema. Widening of the internal auditory meatus was noted. Moderate contrast enhancement was seen in it-Schwannoma (c) Axial CECT brain showing a homogeneously enhancing mass occupying most of the fourth ventricle causing proximal ventricular dilatation- Ependymoma. (d) Axial NCCT brain showing a large hyperdense posterior fossa lesion in the midline, with dilatation of lateral and third ventricle- Medulloblastoma.



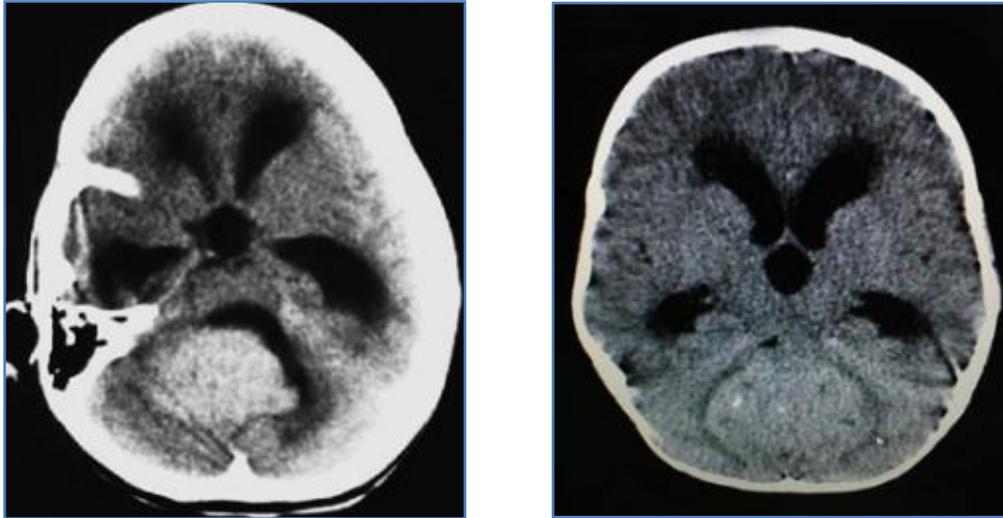
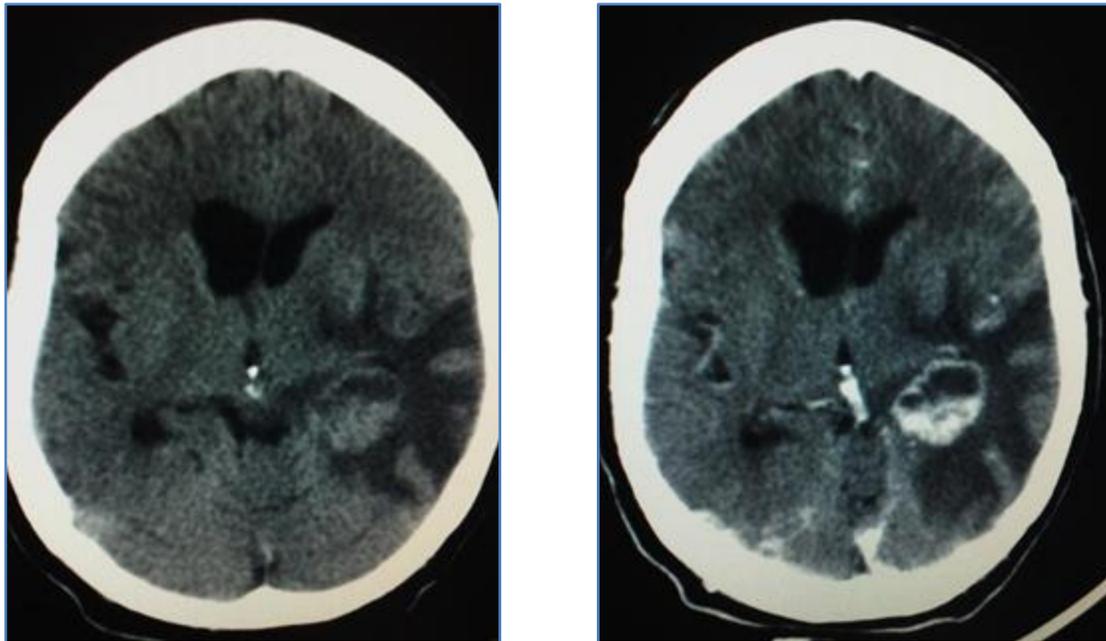


Fig. 8

CEREBRAL METASTASIS:

Figure 9: (a, b) Axial NCCT & CECT brain showing an irregular isodense ring enhancement lesion with marked edema and mass effect in a known case of carcinoma breast (c, d) Axial CECT brain showing multiple hyperdense lesions in a known case of renal cell carcinoma-Hemorrhagic metastasis.



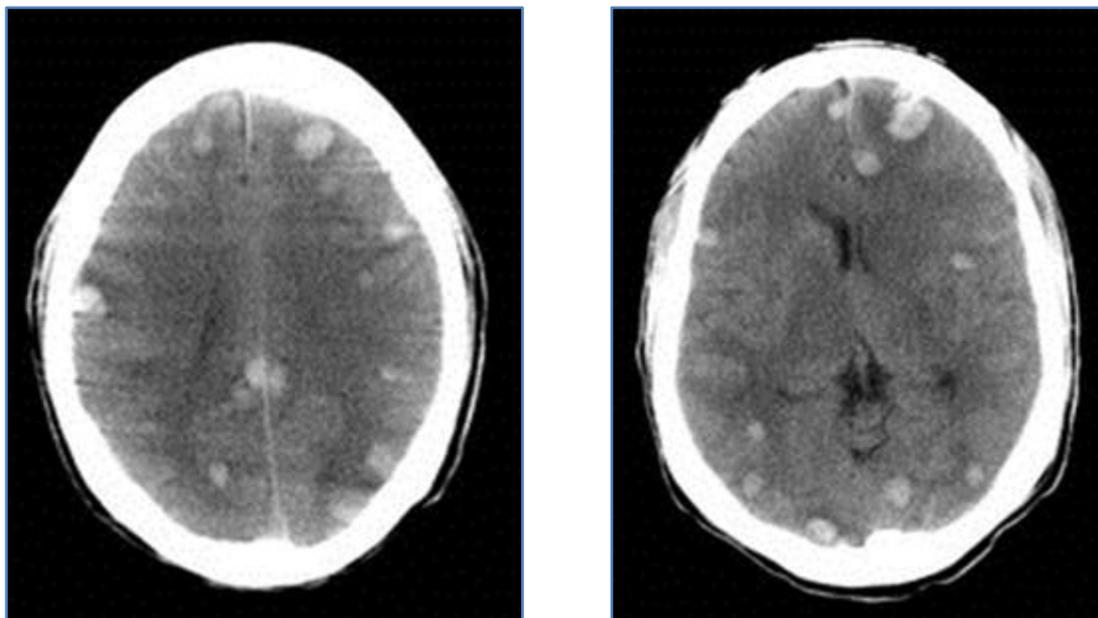


Fig. 9

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