Intracranial

Tumours

General Considerations

- *The **term intracranial tumours** is used to refer to all neoplasms arising from the skull, meninges, blood, blood vessels, pituitary and pineal glands, cranial nerves, brain tissue, or congenital rests, as well as metastatic tumours.*
- *Although either benign or malignant, **almost all brain tumours are malignant** in the sense that they may lead eventually to death if not treated.*

Epidemiology

- *Brain tumours are responsible for 2% of all cancer deaths.*
- *The incidence varies with age.*
- *Metastatic brain tumour is the most common intracranial neoplasm comprising about 15-20% of them.*

Classification of brain tumours

- *The classification of brain tumours is determined by their cell of origin.*
- *Over 50% are neuroepithelial in origin, 15% metastatic, 15% meningioma and 8% pituitary tumours.*
- *The World Health Organization (WHO) classification of brain tumours is outlined in the next slide.*

(WHO) Classification of brain tumours

A. *Neuroepithelial Tumours:*
B. *Nerve sheath tumour: acoustic neuroma*
C. *Meningeal Tumours: Meningioma*
D. *Pituitary Tumours*
E. *Germ cell tumours: e.g. Germinoma, Teratoma*
F. *Lymphomas*
G. *Tumour-like malformations:*
H. *Metastatic Tumours*

Neuroepithelial Tumours

1) *Gliomas:*
   - *Astrocytomas*
   - *Oligodendrogliomas*
   - *Ependymoma*
   - *Choroid plexus tumour*
2) *Pineal Tumours*
3) *Neuronal Tumours*
4) *Medulloblastoma*

Tumour-like malformations

1) *Craniopharyngioma*
2) *Epidermoid tumour*
3) *Dermoid tumour*
4) *Colloid cyst*

Aetiology of Brain Tumours

- *Not clearly understood.*
- ***Chromosome abnormalities** have been noted in many CNS tunours (e.g. von Recklinghausen's).*
- ***Immunosuppression** :primary CNS lymphoma.*
- *Mutation in the p53 tumour suppressor gene is the most common **gene alteration** and is found in both **astrocytoma and meningioma**.*

Clinical Features of Brain Tumours

- *This will result from one or a combination of:*

1) Organic mental changes

2) Raised intracranial pressure

3) Seizures, and

4) Focal neurological sign

Clinical Features of Brain Tumours

1) *May be **symptomless**.*
2) ***General impairment of the cerebral functions** such as amnesia, irritability, confusion, or dementia.*
3) *Evidence of **increased intracranial pressure** as headache, vomiting, and blurring of vision.*
4) ***Seizures***
5) ***Focal neurological signs***

Focal neurological signs of Brain Tumours

- *Contralateral signs :**posterior frontal area** (motor), or **anterior parietal** (sensory) lobe.*
- *Tumours in the **dominant hemisphere** : problems with language (aphasia) and in the non-dominant hemisphere apraxia.*
- *The **optic pathway** : various visual symptoms, usually a contralateral homonymous hemianopia.*
- ***Temporal lobe lesions** : focal seizures with auras and visual field defects.*
- *Tumours in the **frontal lobes** : altered cognitive functioning and subtle personality changes.*

Focal neurological signs of Brain Tumours

- ***Subfrontal lesions** : olfactory nerves (anosmia).*
- ***Sellar and parasellar tumours** : visual field and acuity problems due to compression of the optic chiasm, hypopitutarism and oversecretion syndromes such as Cushing's disease and acromegaly.*
- *Tumours in relation to the **ventricular system** : hydrocephalus, compounding raised ICP.*
- *Tumours of the **brainstem and cerebellopontine angle**: cranial nerve palsies, long tract signs and secondary hydrocephalus.*
- *Tumours involving the **cerebellar vermis** cause truncal ataxia, whereas tumours in the hemispheres produce appendicular signs such as incoordination and nystagmus*

Behavior Changes

Headache

Vomiting

Papilloedema

Ataxia

Investigations of Brain Tumours

1. *Plain Skull x-ray*
2. *Computed Tomography (CT-scan)*
3. *Magnetic Resonance Imaging (MRI)*
4. *Angiography*

Investigations of Brain Tumours

*I. **Plain Skull x-ray**:*

- *a. May be **normal***
- *b. May show changes due to **raised intracranial pressure***
- *c. **Local changes** may occur with specific tumours: like*

1. Suprasellar calcification in craniopharyngiomas

2. Hyperostosis and skull thickening in meningioma.

Investigations of Brain Tumours

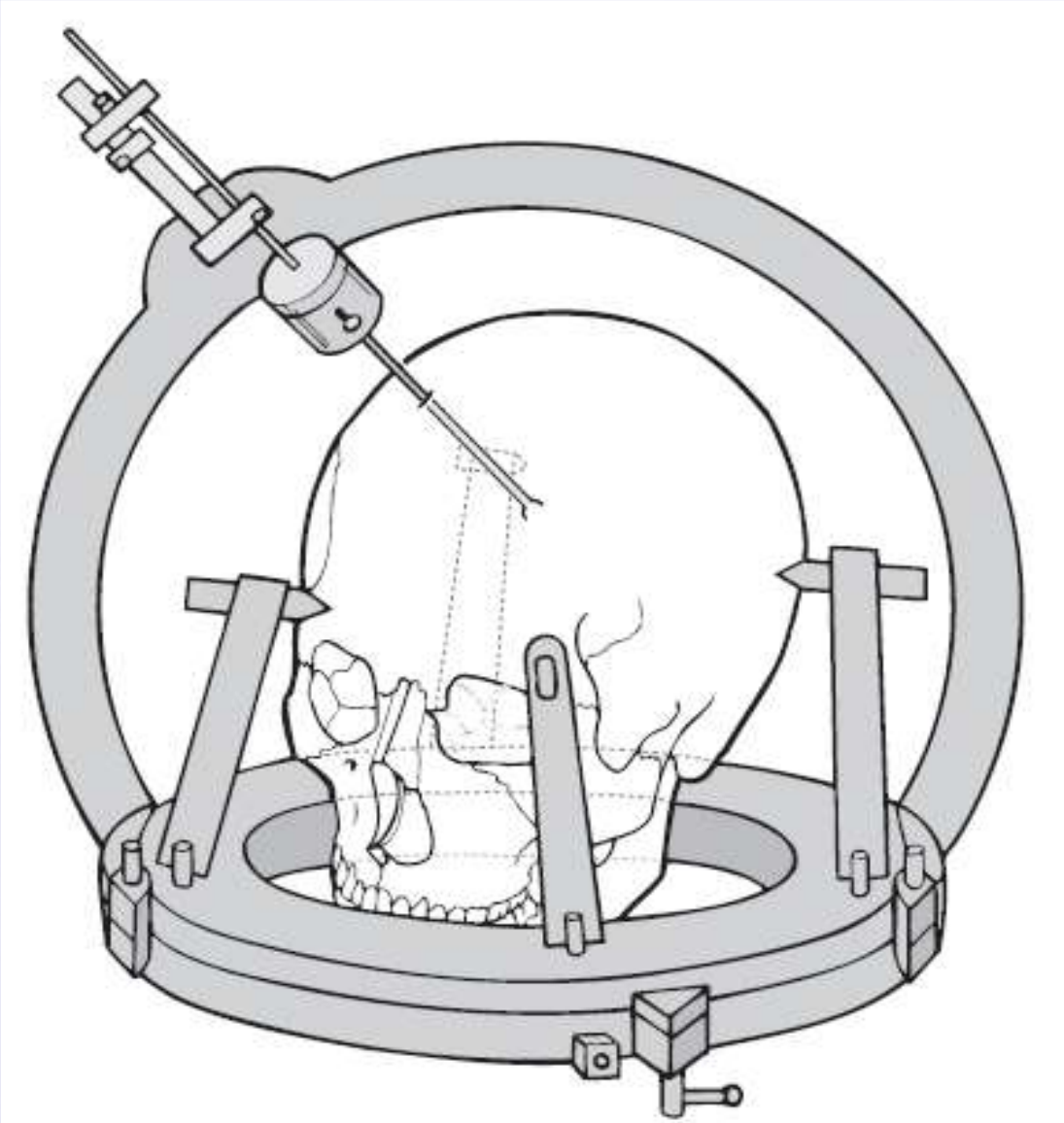
Computed Tomography (CT-scan):

1. ***Site** of the tumour.*
2. ***Boundaries** of the tumour.*
3. *If there is **surrounding oedema** or not.*
4. ***Shift of the midline** structures by the mass.*
5. *Associated **hydrocephalus**.*
6. ***Bony changes**.*
7. ***Nature of the tumour** (solid, cystic, necrotic or calcified), and so its pathology.*

Management of intracranial tumours

1. *If the patient shows signs of compression, or **raised intracranial pressure**, treat this as mentioned in the first lecture.*
2. *If an intracranial tumour is associated with **hydrocephalus**, the hydrocephalus is dealt with first by a ventriculoperitoneal shunt before surgery.*
3. ***CT or MRI guided stereotactic surgery** : tumour is deeply seated in the brain.*
4. *In cases of malignant brain tumours or metastases : **adjunctive therapy** : **Radiotherapy and/or Chemotherapy** are supplementary to surgical excision.*

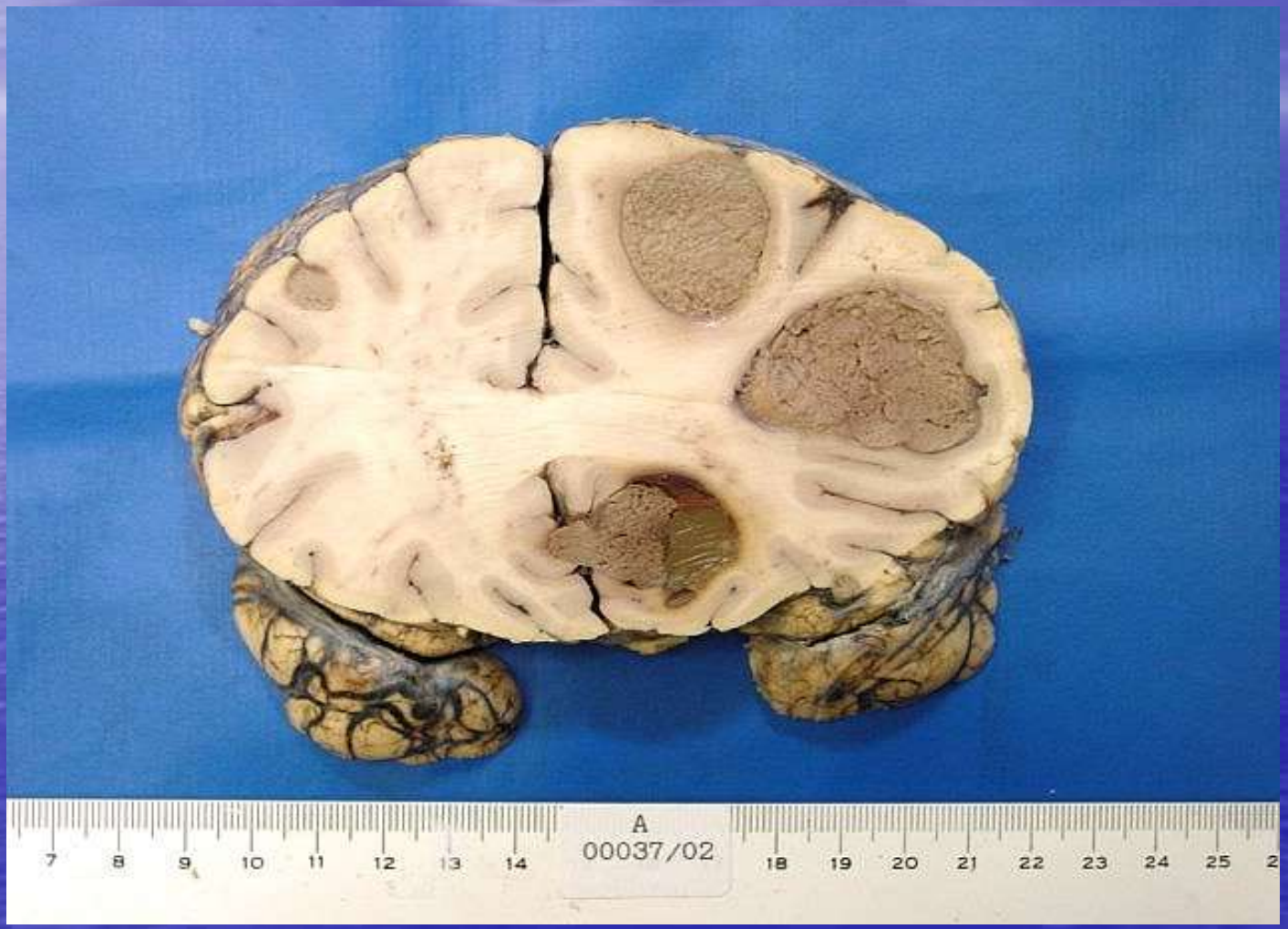
Stereotactic Neurosurgery



Metastatic Brain Tumours

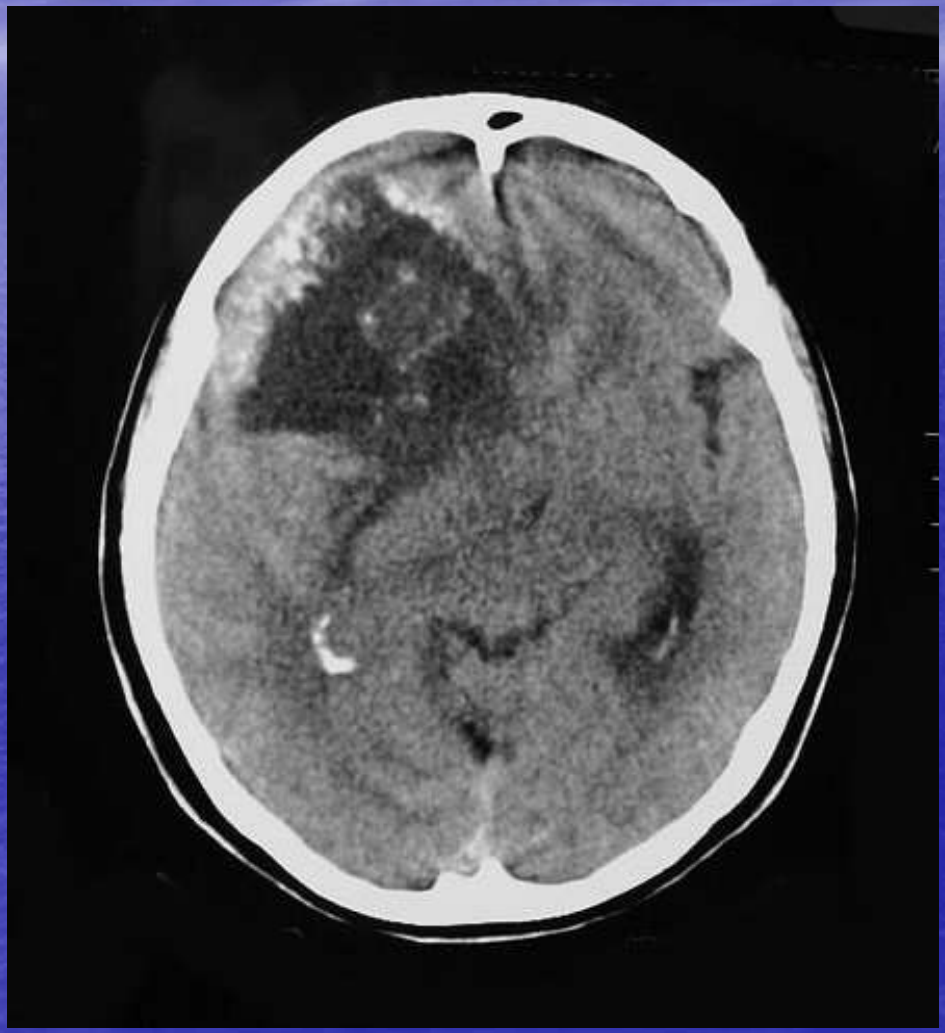
- *Constitute **15%** of intracranial tumours.*
- *The commonest sites of origin are the **lung** (20%) and **breast** (20%), in addition to **melanoma, kidney and colon.***
- *In 15% of cases, a **primary source is never found**.*
- *On **CT**, they only show well with intravenous contrast.*
- ***Steroids** may help reduce peritumour oedema.*
- ***Surgery** may be appropriate for an **isolated metastasis.***
- ***Radiotherapy** can be used for multiple metastases.*

Metastatic Brain Tumours

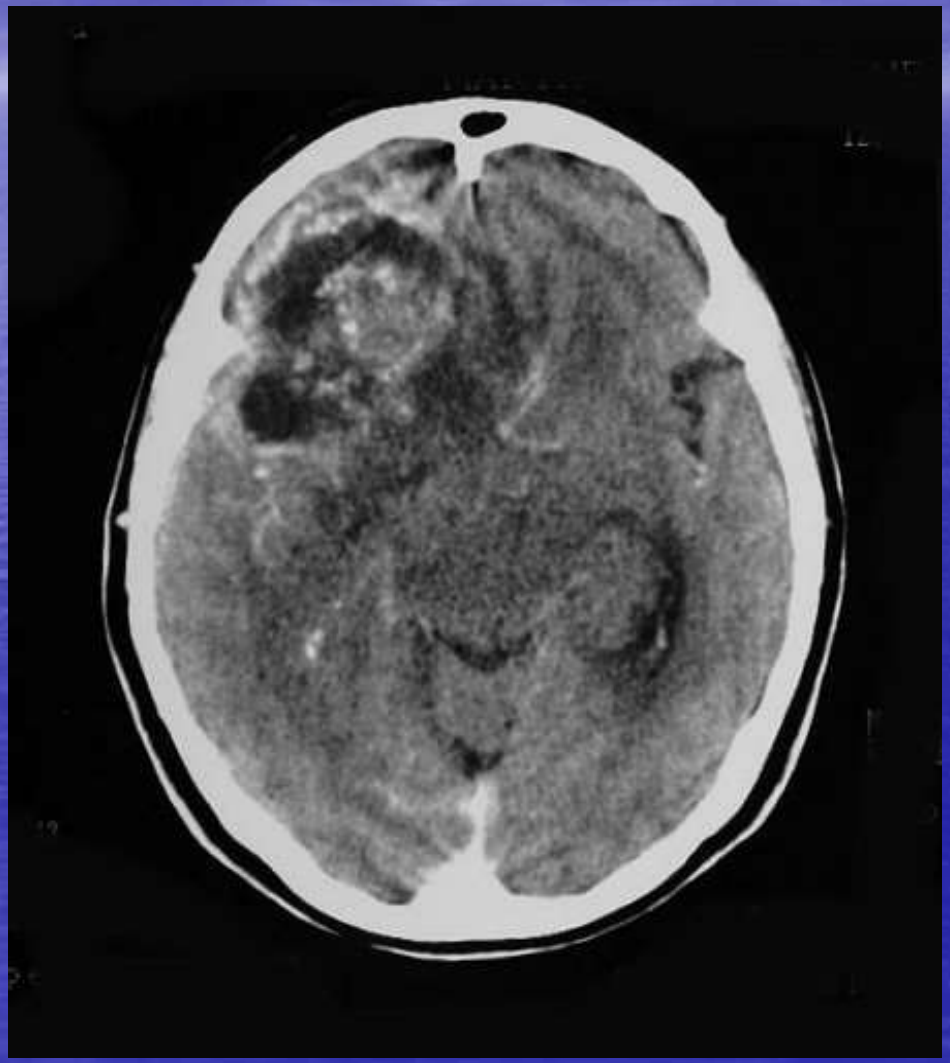


Metastatic Brain Tumours

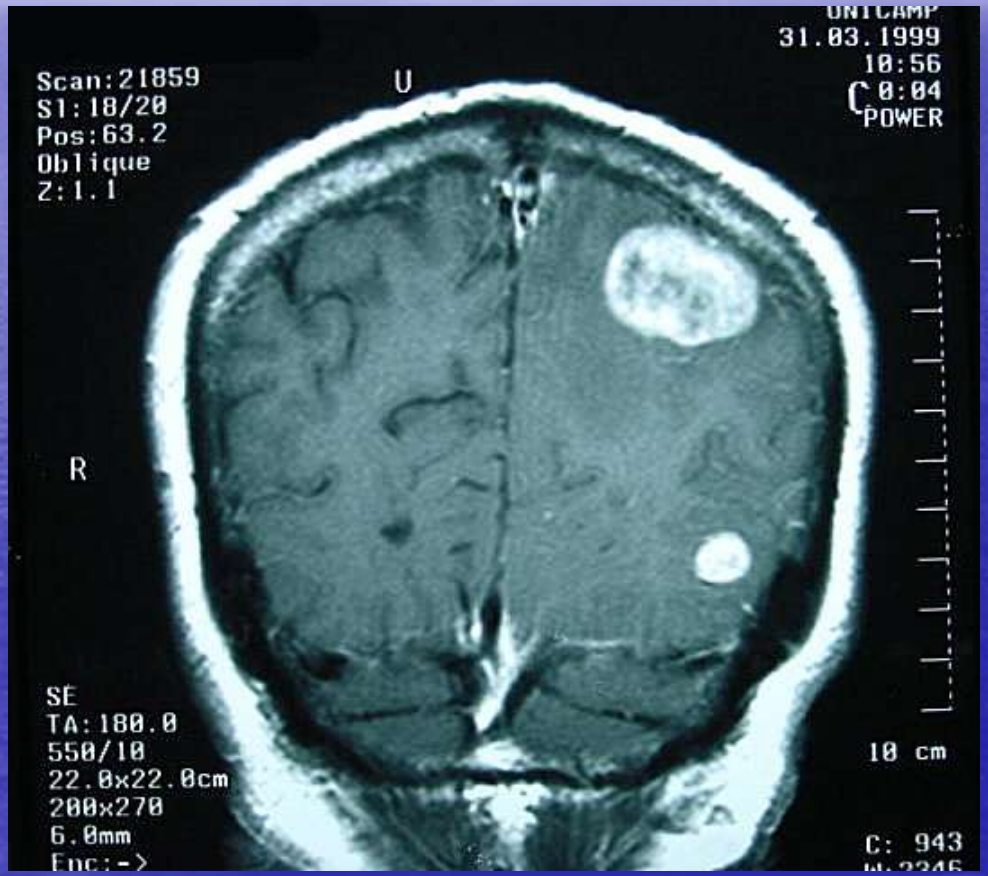
Pre contrast CT



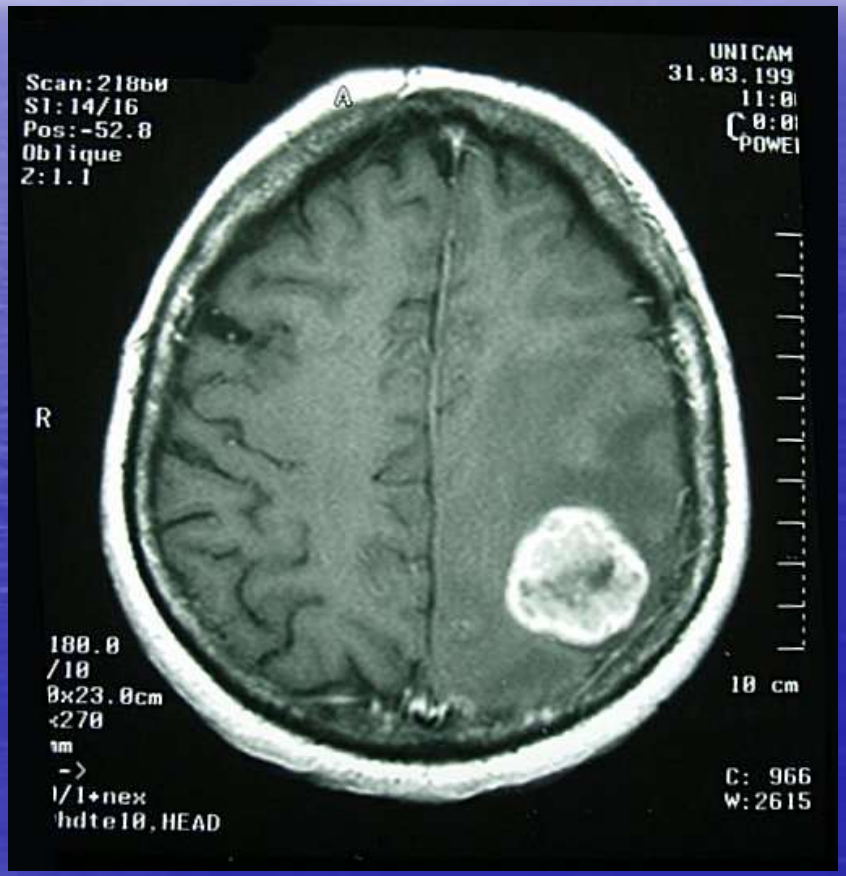
Metastatic Brain Tumours
Post contrast CT



Metastatic Brain Tumours
MRI



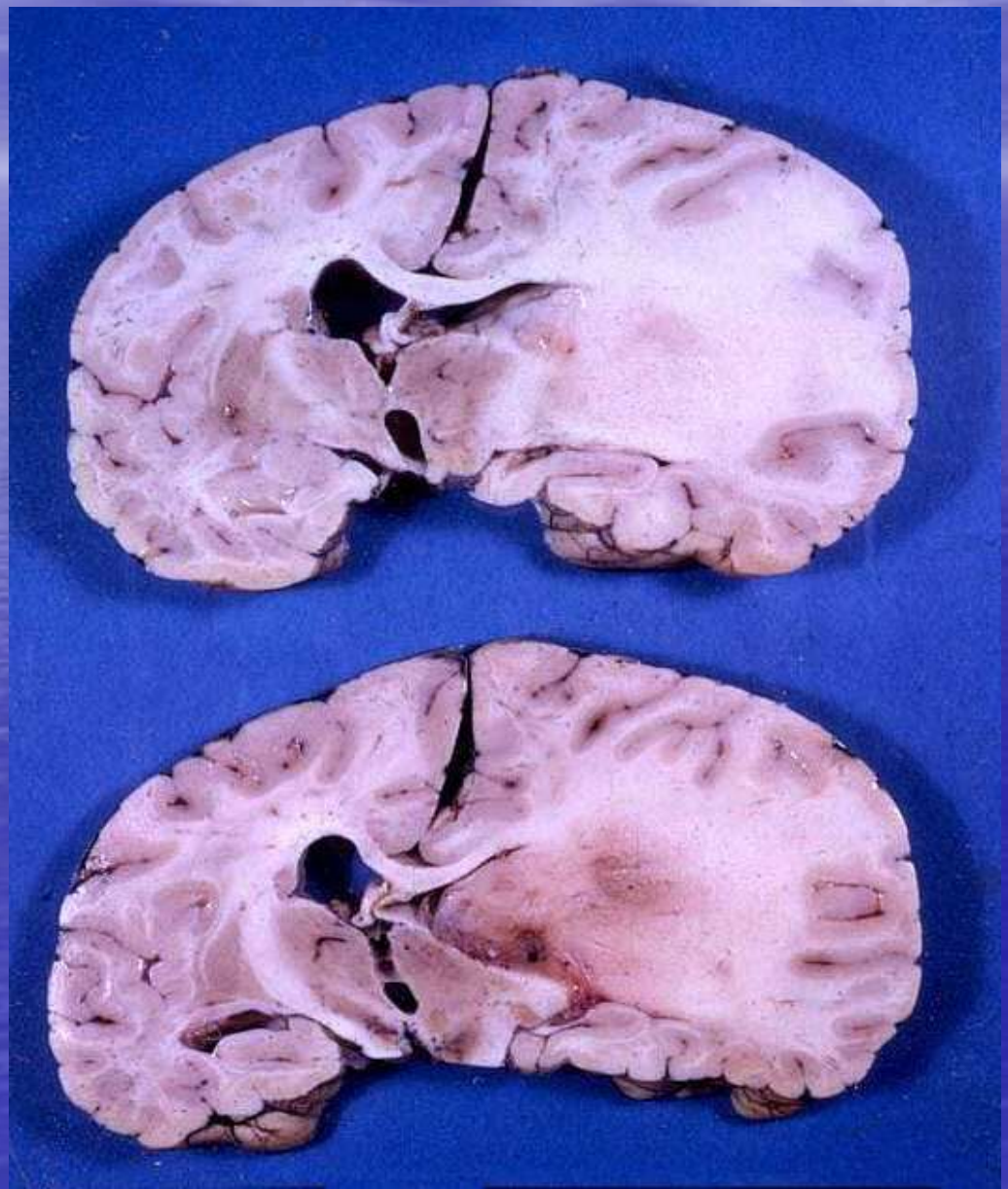
Metastatic Brain Tumours
MRI



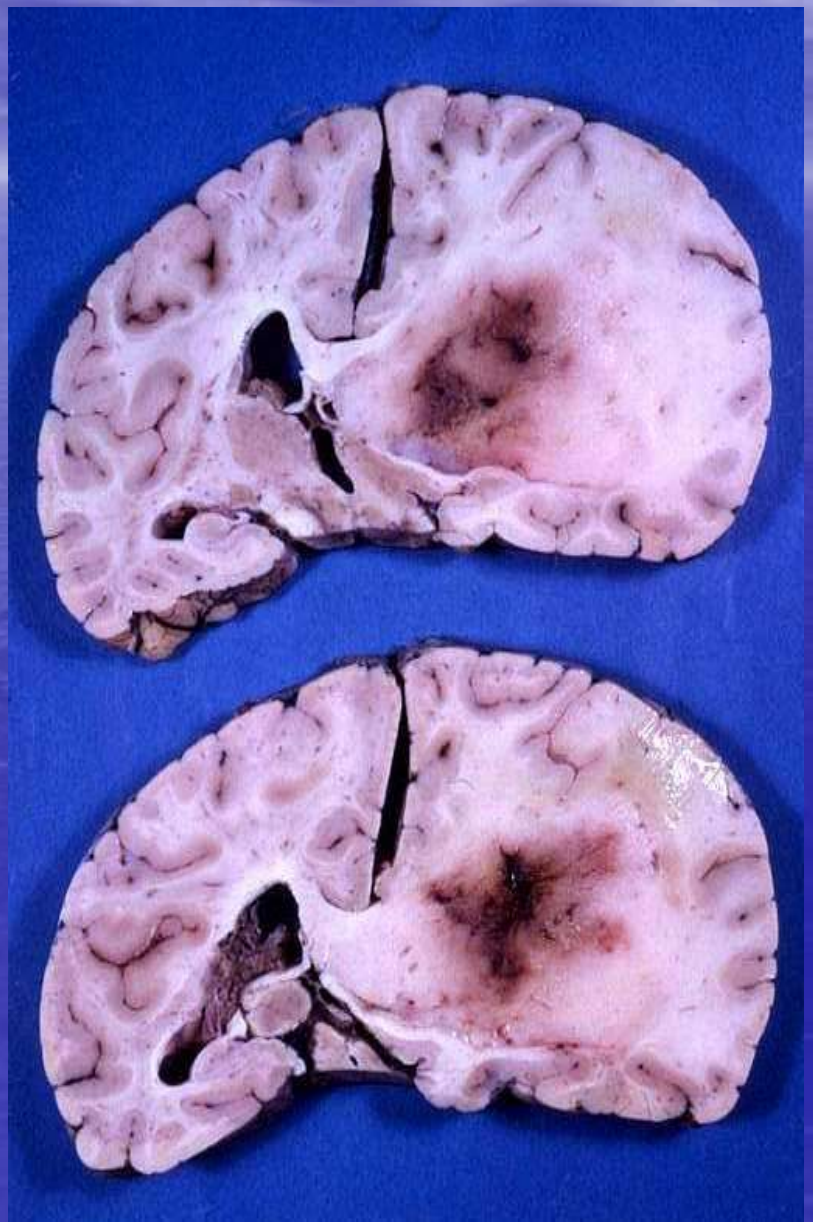
Gliomas

- *They are derived from cells of **glial origin**.*
- *They are the **commonest of primary CNS neoplasms**.*
- *They form **50% of adult intracranial tumours**.*
- *They are of **four types**: **astrocytoma, oligodendroglioma, ependymoma and choroid plexus papilloma**. The most common of which is astrocytoma.*
- ***Survival** is closely associated with **grading**.*
- *Treatment involves **surgery and radiotherapy and/or chemotherapy.***

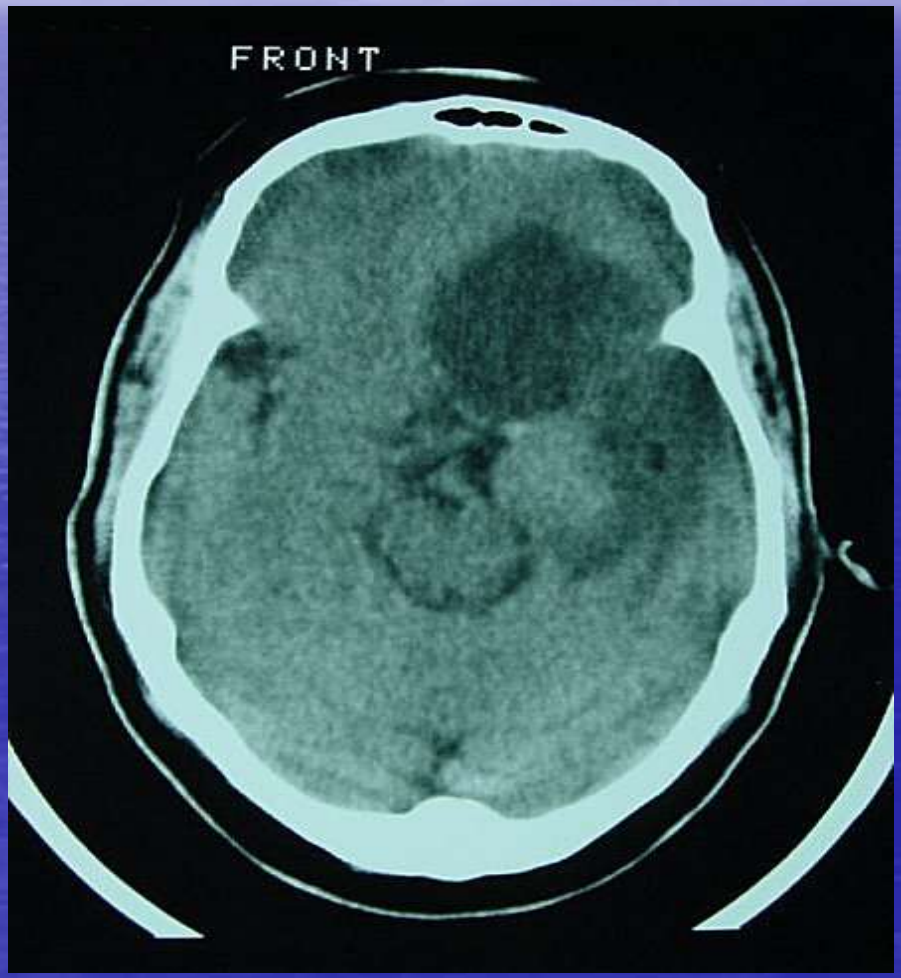
Glioma



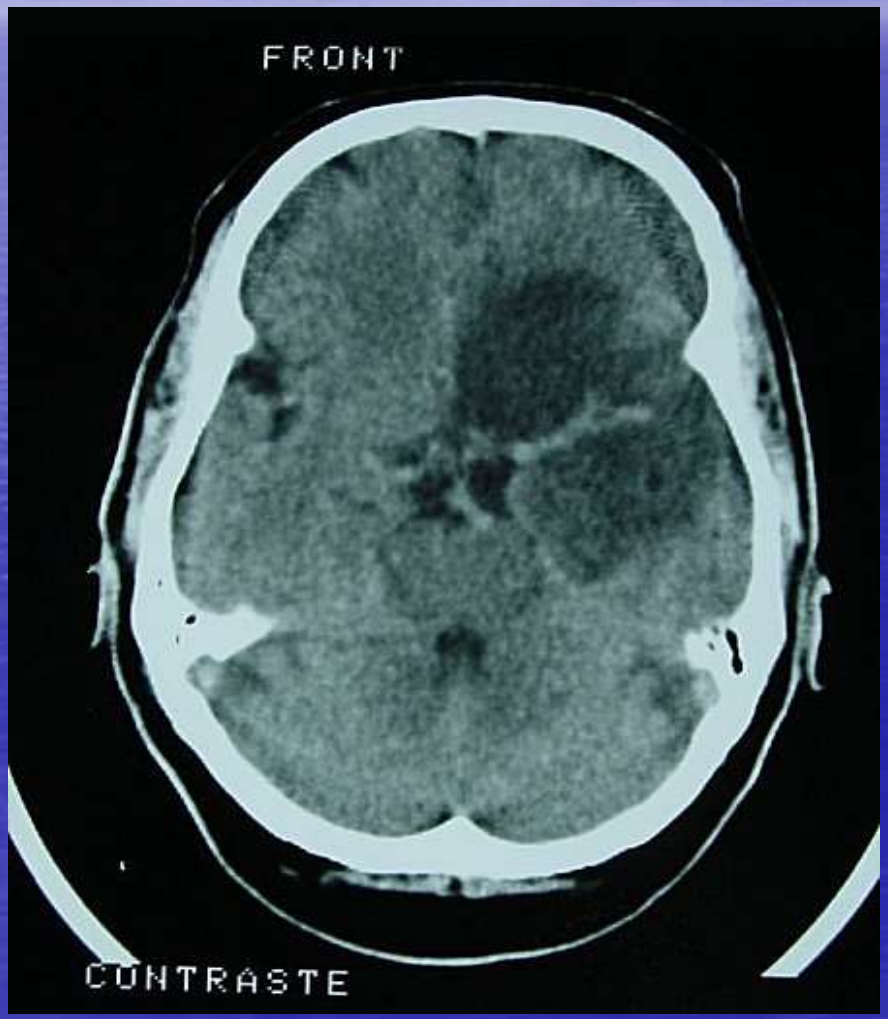
Astrocytoma



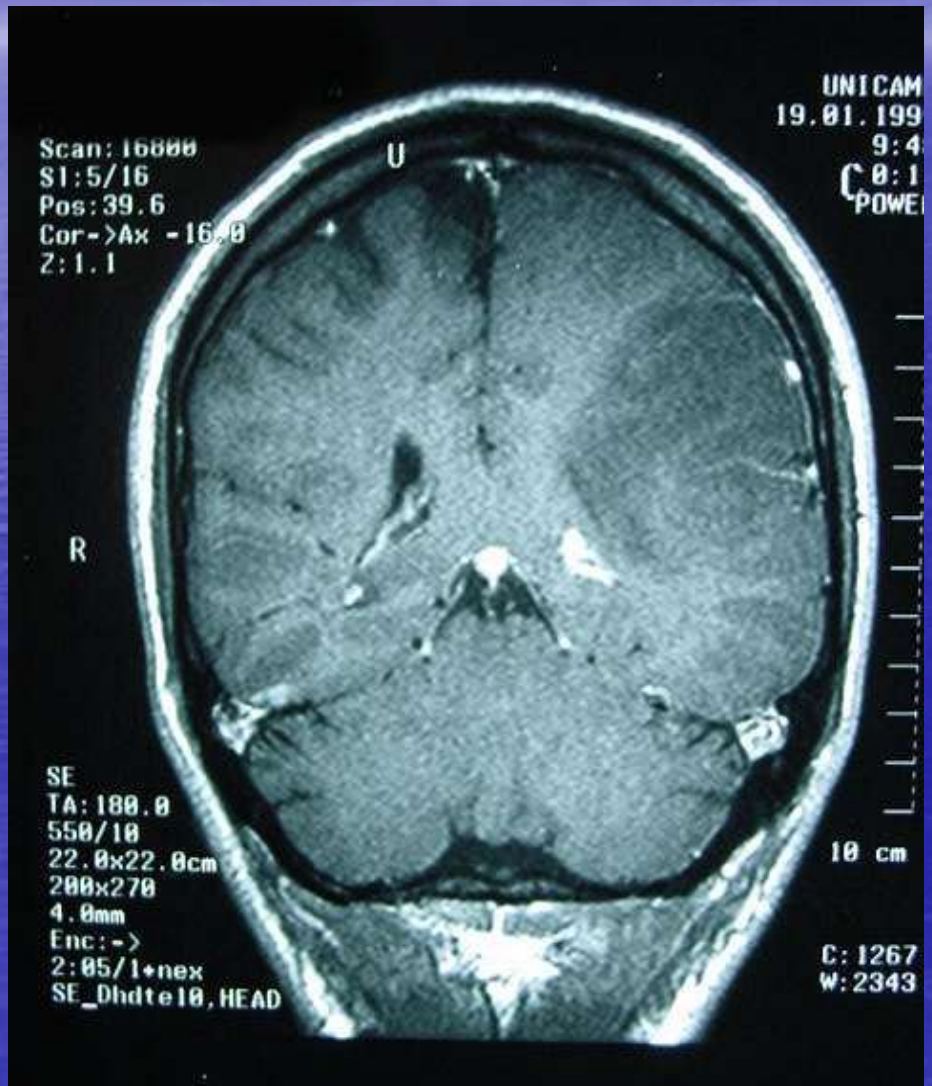
Astrocytoma
Pre contrast CT



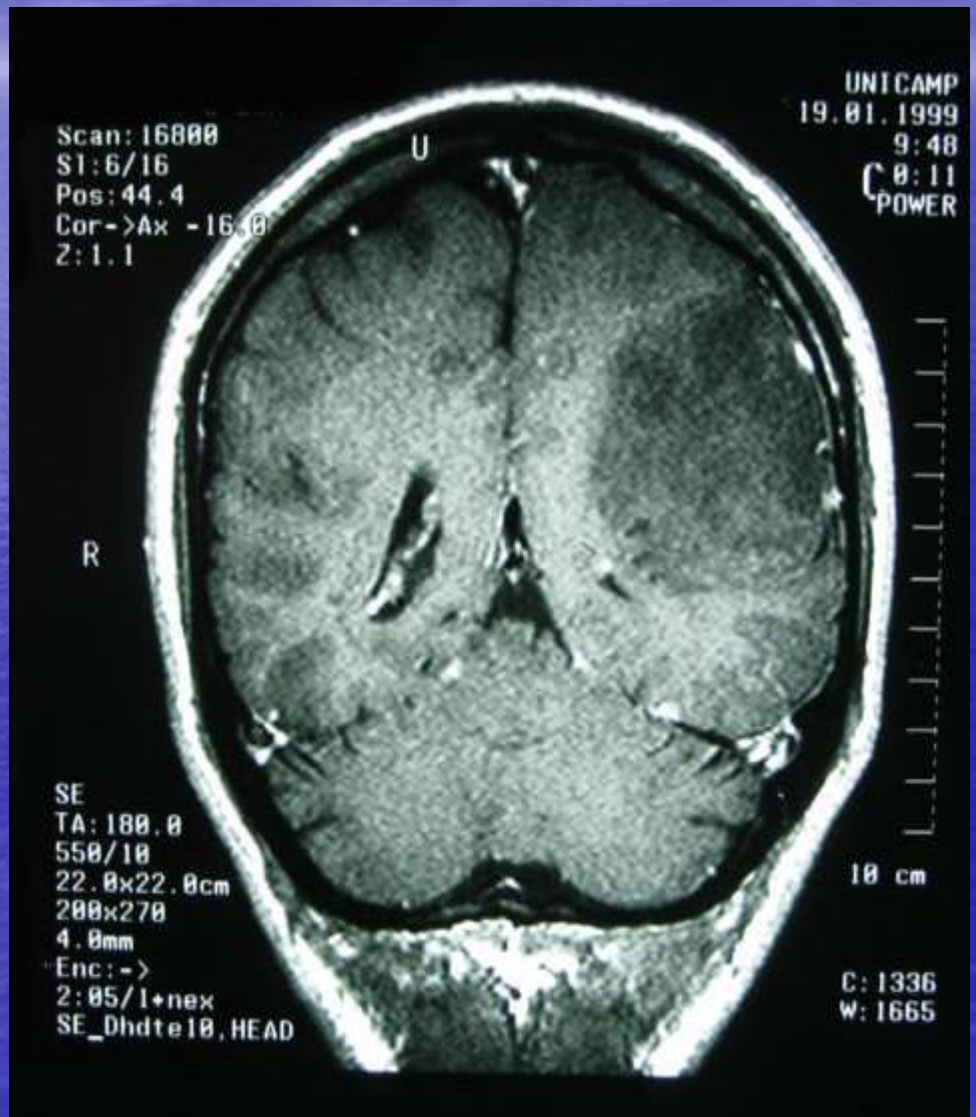
Astrocytoma
Post contrast CT



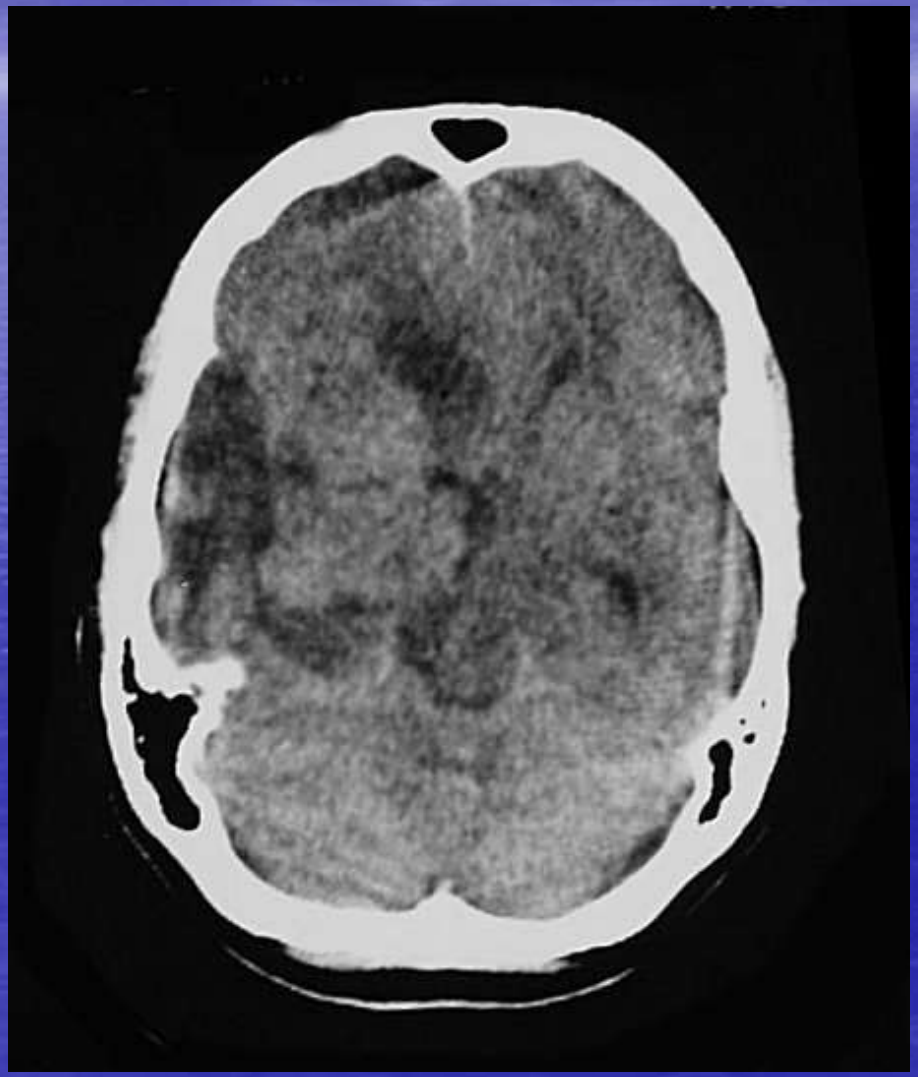
Astrocytoma
Pre contrast MRI



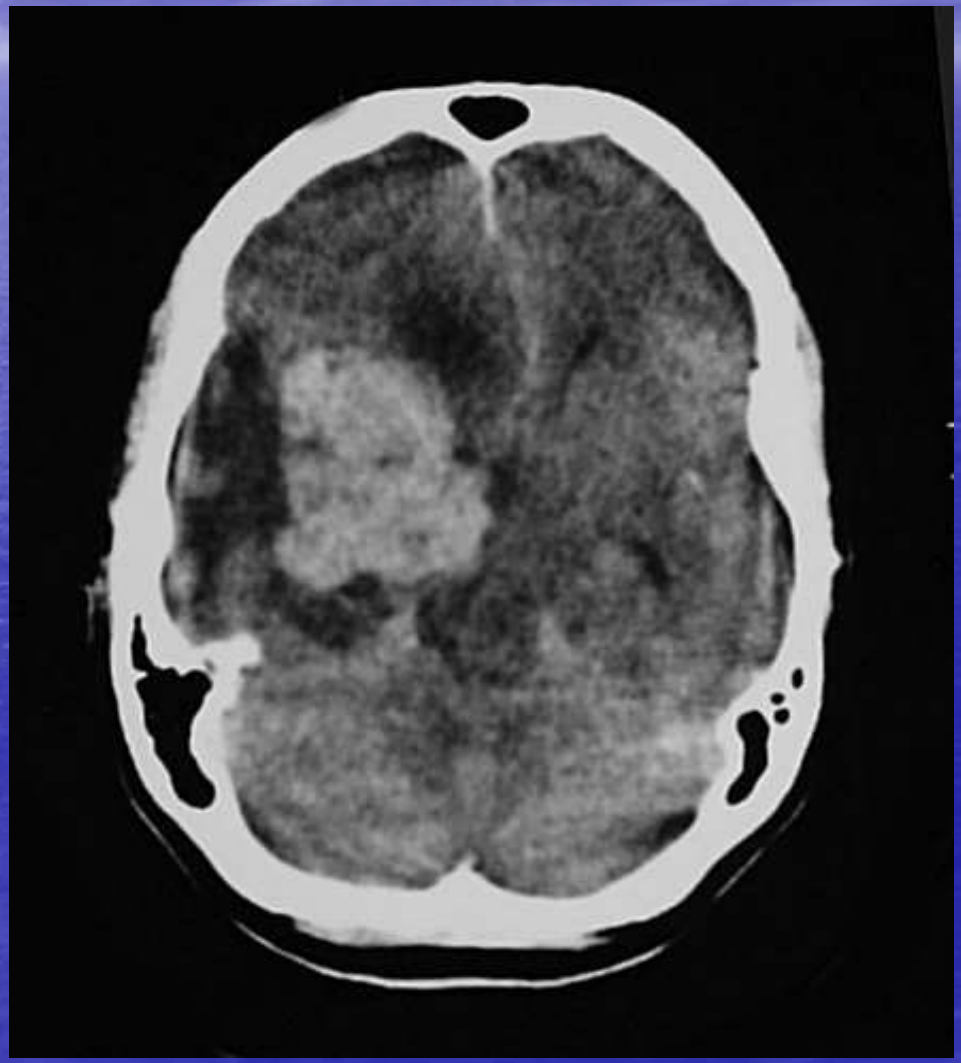
Astrocytoma
Post contrast MRI



Malignant Glioma
Pre contrast CT



Malignant Glioma
Post contrast CT



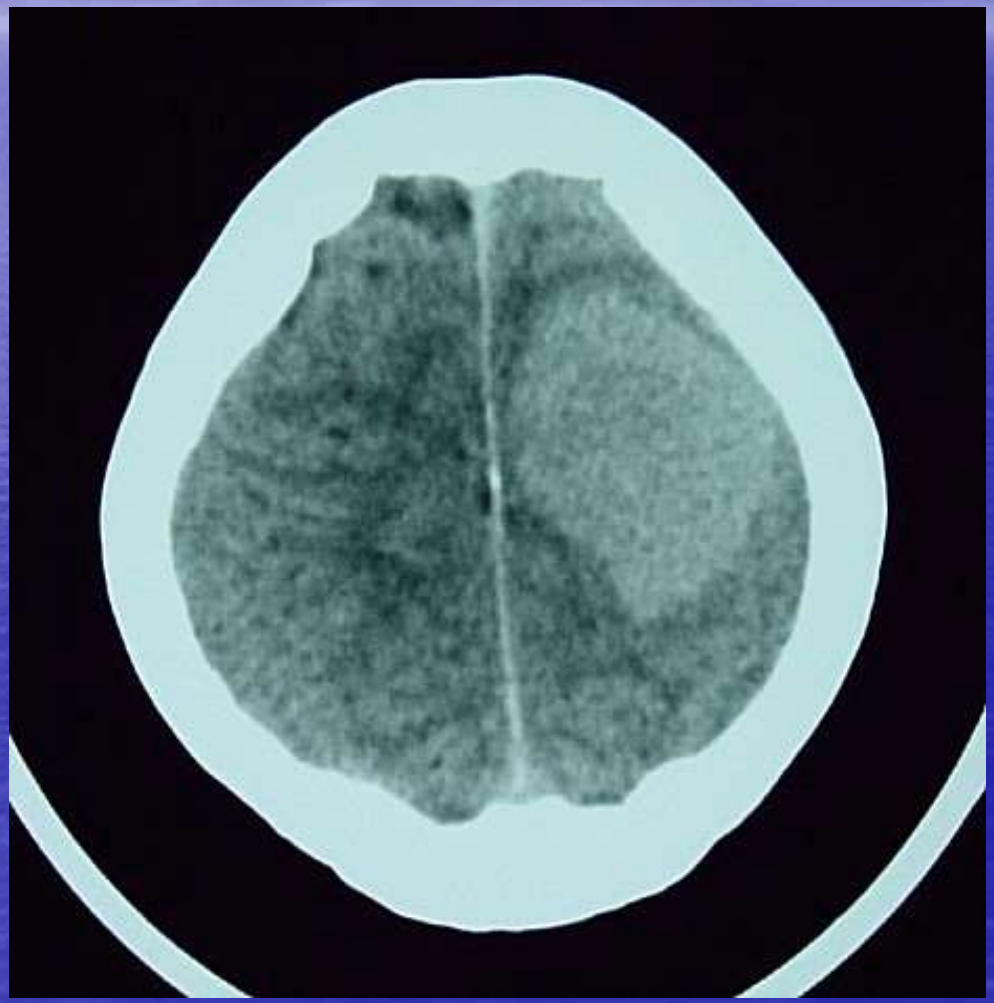
Meningiomas

- *These account for **15%** of intracranial neoplasms, and are the most common benign neoplasm.*
- *They occur **more frequently in women** than in men, and their incidence **peaks in middle age**.*
- *The tumour arises from the **arachnoid villi**.*

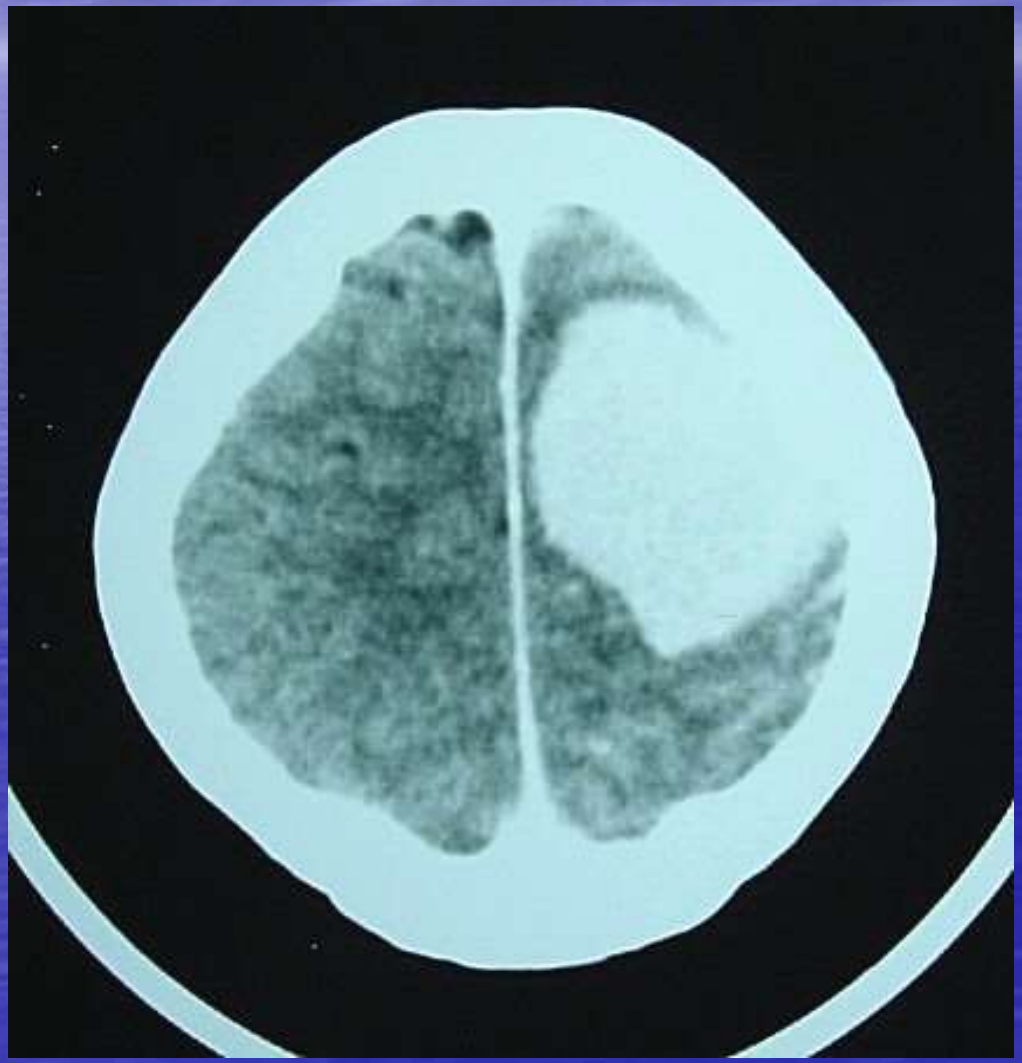
Meningiomas

- *They classically arise from a **broad base along the dura.***
- *They may **invade bone**.*
- *They derive their blood supply from the **external carotid circulation**.*
- ***Malignant meningiomas** are relatively rare.*
- *The symptoms and signs are related to those of **intracranial mass lesions or seizures**.*
- ***CT scan** accurately diagnoses the lesions.*
- ***Complete surgical removal** usually results in cure.*

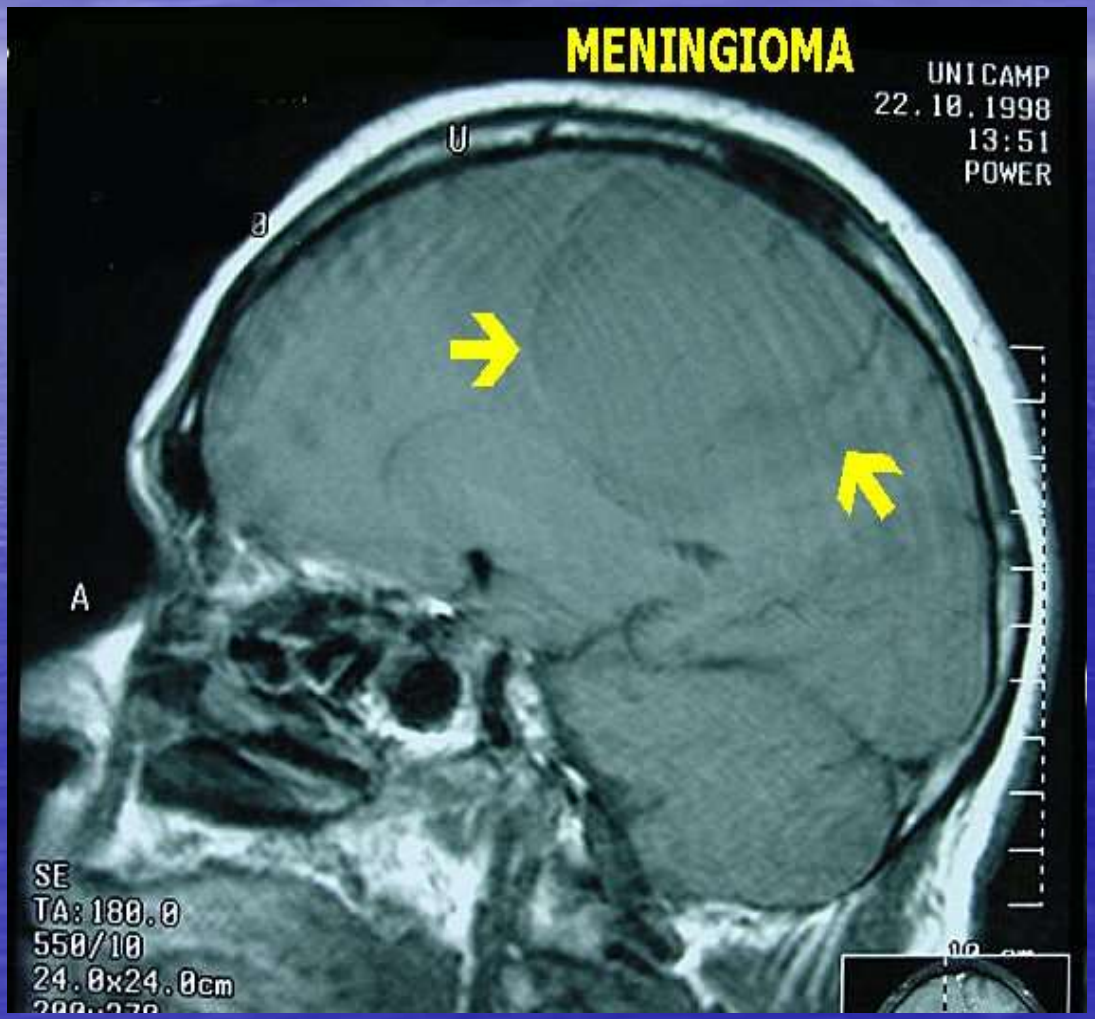
Meningioma
Pre contrast CT



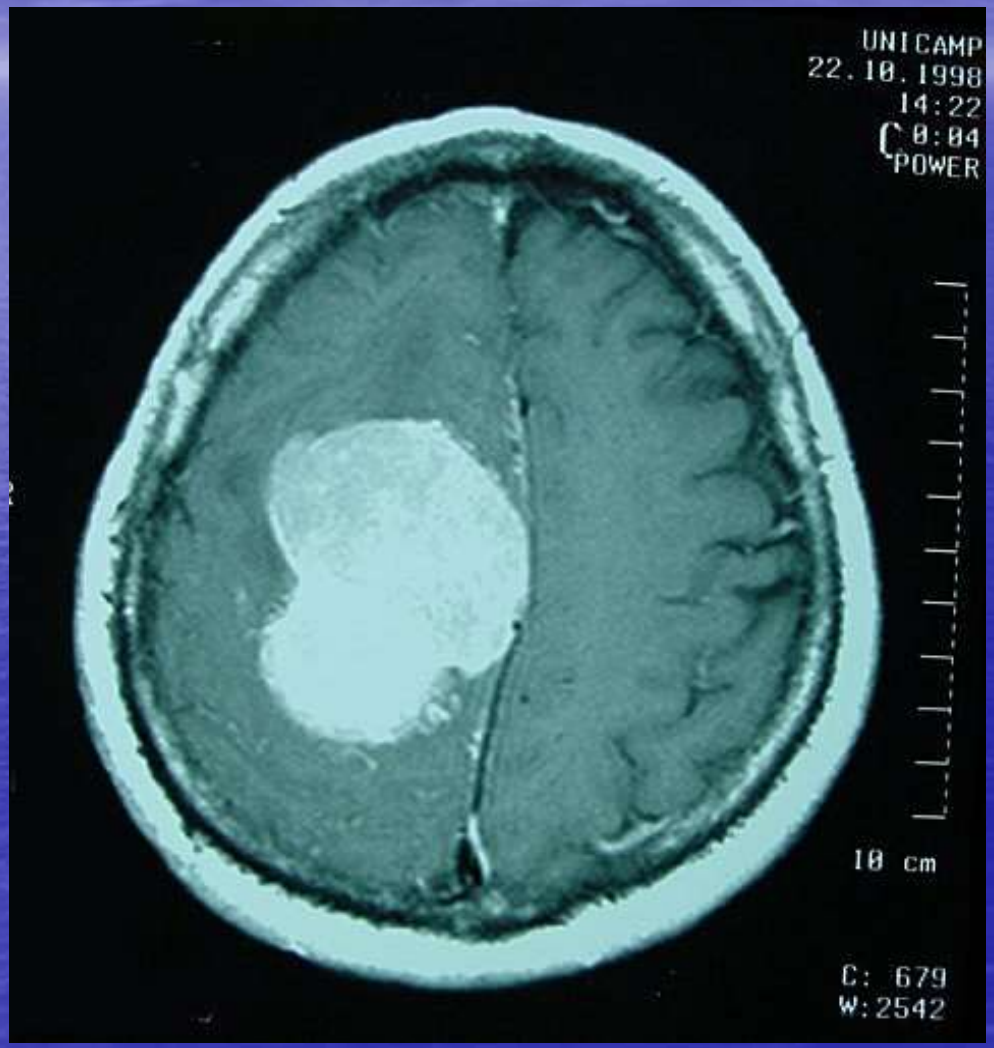
Meningioma
Post contrast CT



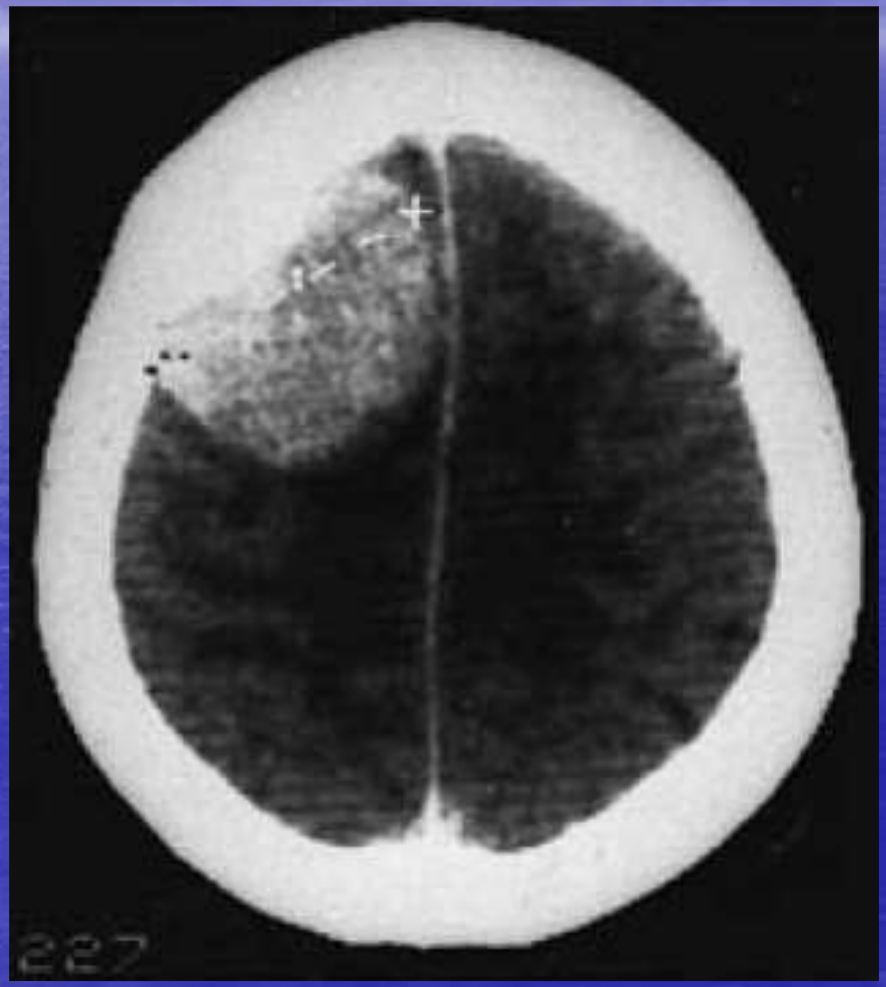
Meningioma
Pre contrast MRI



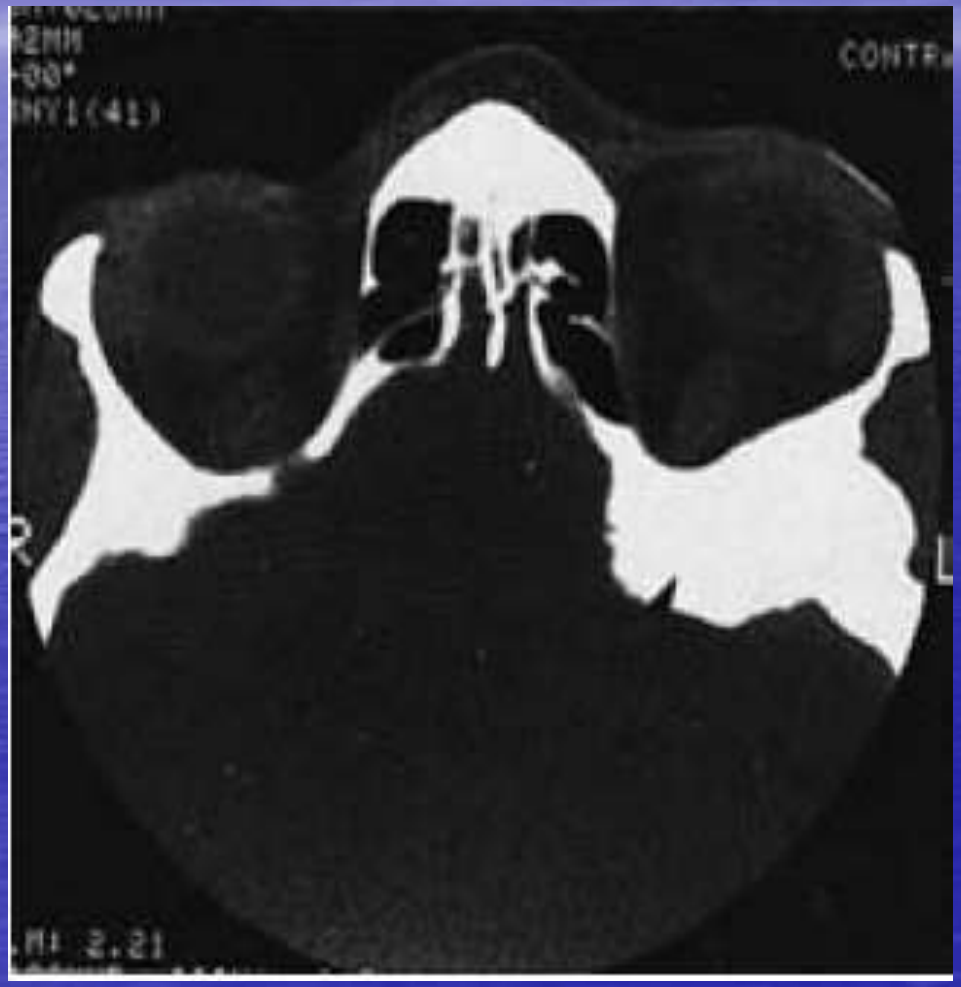
Meningioma
Post contrast MRI



Meningioma
Bone Involvement



Meningioma
Bone Involvement



Pituitary Tumours

- *Non-functioning pituitary adenomas*
- *Functioning pituitary adenomas*

Non-functioning pituitary adenomas

1. *Accounts for about **30%** of pituitary tumours.*
2. *They are often seen in the **fourth and fifth decades of life.***
3. *Because they are non-functioning, they are **not generally diagnosed until they are very large.***
4. *Their presentation is by **optic chiasm compression** that cause visual field defect (bitemporal hemianopia).*
5. *The usual treatment is **microscopic trans-sphenoidal or trans-cranial excision**.*

Functioning pituitary adenomas

1. *Pituitary adenomas are classified according to the hormones they secrete. They include:*
   - *i.* ***Prolactin secreting adenomas.***
   - *ii.* ***Growth hormone secreting adenomas*** *that produce acromegaly or gigantism.*
   - *iii.* ***Glycoprotein secreting adenomas*** *that produce excess amount of TSH, LH, or FSH.*
   - *iv.* ***ACTH secreting adenomas*** *that produce Cushing's disease.*
   - *v. Some of these* ***secrete more than one hormone****, e.g. prolactin-growth hormone secreting adenomas.*

Functioning pituitary adenomas

2. *Adenomas may be further divided according to their sizes into **Microadenomas** that are less than 1 cm in diameter, and **Macroadenomas** that have a larger size.*
3. *Functioning adenomas are **diagnosed by**:*

i. *Clinical changes.*
ii. *Hormone assessment. And*
iii. *Radiology by using MRI and CT scan.*

Functioning pituitary adenomas

4. *Prolactinomas represent **40%** of all pituitary adenomas. They cause **amenorrhoea, galactorrhoea, and infertility in women**, while in **men** they cause **impotence or may be asymptomatic**.*
5. ***Bromocriptin** (antiprolactin drug) has virtually replaced surgery as the treatment of choice for prolactinomas.*
6. ***Surgical excision** can preferably done by using the **trns-sphenoidal route**, whether **sublabial** or **transnasal**, although transcranial approach can also be used.*
7. *In case of an invasive tumour with incomplete excision, **radiotherapy** is required*

DO NOT FORGET

1. *The most significant findings pointing to an intracranial tumour on physical examination are the presence of **papilloedema** and signs of **focal damage** to the nervous system.*
2. *If a cerebral tumour is suspected, **LUMBAR PUNCTURE IS CONTRAINDICATED** as it may precipitate a fatal coning of the brain stem through the foramen magnum.*

THANK

YOU