

DIAGNOSIS OF A BRAIN TUMOUR: POSSIBLE SYMPTOMS

- A new seizure in an adult
- Gradual loss of movement or sensation in an arm or leg
- Unsteadiness or imbalance, especially if it is associated with headache
- Loss of vision in one or both eyes, especially if the vision loss is more peripheral
- Double vision, especially if it is associated with headache
- Hearing loss with or without dizziness
- Speech difficulty of gradual onset
- Nausea or vomiting that is most severe in the morning, confusion and disorientation, and memory loss.
- The following symptoms are usually not caused by a brain tumour, but may sometimes be as a headache, abnormal change in behavior, infertility or amenorrhea.

Based on the above mentioned symptomatology which is always backed up with a sound history taking, the next eminent step is the diagnostic imaging techniques that have evolved immensely over the past years and have become a valuable adjunct to the sphere of Neuro-oncology.

DIAGNOSTIC IMAGING: Contemporary imaging modalities

Imaging	Remarks	Pros	Cons
CT scan	First line imaging modality	Good anatomic visualization Cheaper & Faster More widely available Can be used with metal objects	Limited reconstruction ability Exposure to ionizing radiation Poor resolution Contrast reaction
MRI	Gold standard imaging modality	Unparalleled resolution True multiplanar imaging No exposure to ionizing radiation	Susceptible to motion artifacts Cannot be used with metal objects Claustrophobic, noisy, long times Expensive
MR Spectroscopy	Assesses tumour metabolites	Useful for discriminating radiation necrosis from tumour	Limited utility near bone, vessels or air spaces Wide variability in interpretation
MR Perfusion	Assesses blood flow & volume	Generally correlates with grade Useful to distinguish radiation necrosis from tumour progression	Limited utility near bone, vessels

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Fig 1: Non-infiltrative Low Grade Glioma (LGG)/ Glioneuronal Tumours

(Juvenile Pilocytic Astrocytoma / Dysembryoblastic Neuro Ectodermal Tumours / Ganglioglioma / Subependymal Giant cell Astrocytoma/ Neurocytoma)

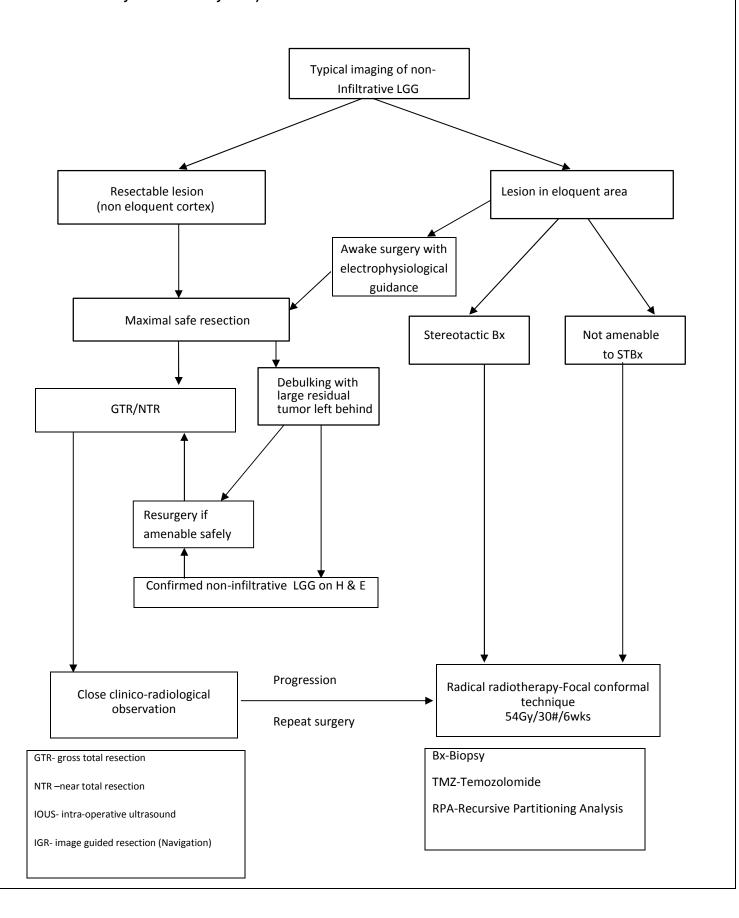
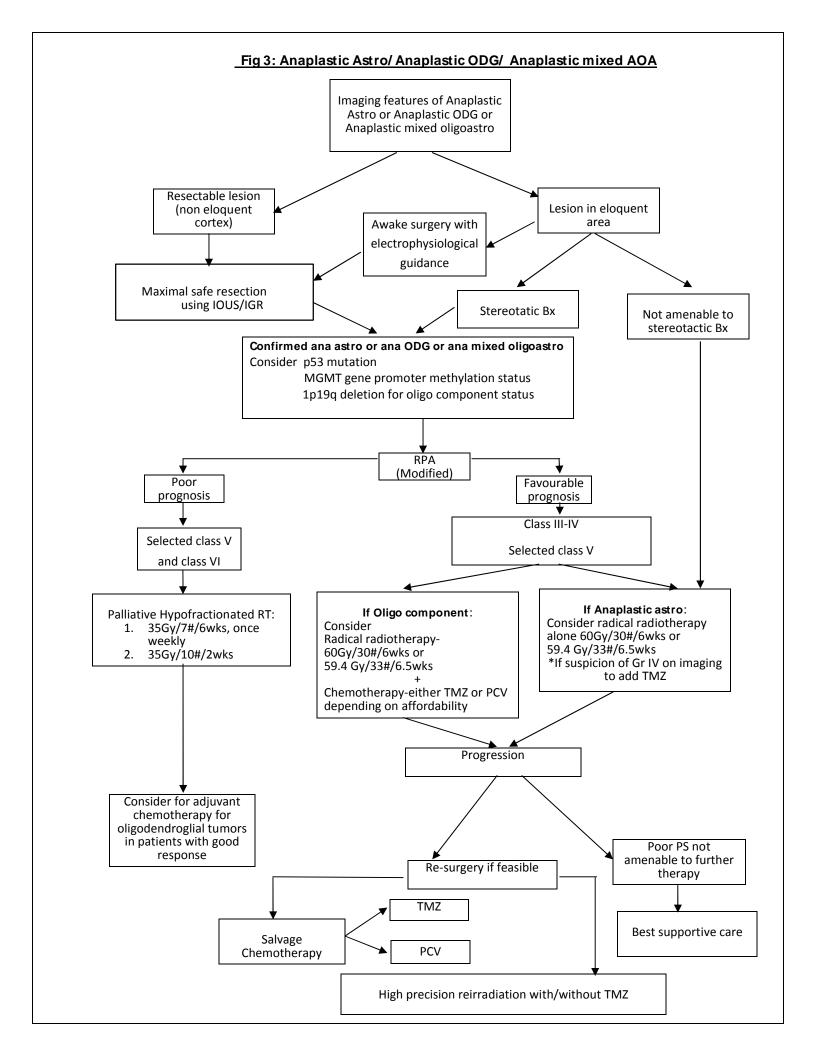


Fig 2: Infiltrating Low grade gliomas including Oligodendrogliomas (ODG) Imaging features of infiltrative LGG Resectable Lesion Lesion in eloquent area (non eloquent area) Awake surgery with electrophysiological guidance Maximal safe resection using Not amenable Stereotactic Bx IOUS/IGR to stereotactic Bx GTR / NTR Debulking Large residual tumor Infiltrative LGG Confirmed infiltrative LGG on H & E 1p19q deletion studies for ODG Expected good compliance to surveillance imaging Poor compliance, and / or unfavourable and favourable Pignatti's Pignatti's criteria criteria* & low MIB-1 and/ or high MIB-1 index and 1p/19q deletion index Progression Radical radiotherapy-Focal conformal technique Close clinico-radiological 54 Gy/30#/6wks Repeat surgery if observation & deferred RT feasible at progression RT (59.4Gy/33# Progression with Chemotherapy Transformation to higher grade *Pignatti's criteria (favorable): 1.Age<40vrs 2.No neurological deficits 3.Size<6 4.Not crossing midline 5.Oligo histology



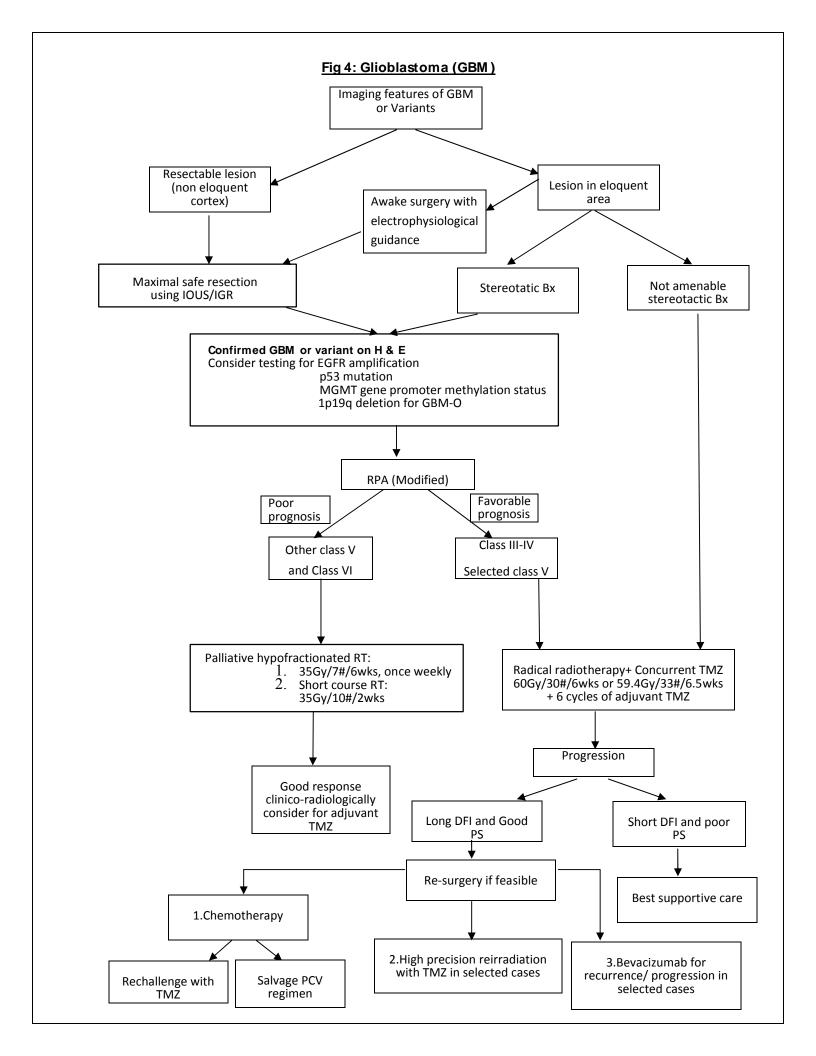


Fig 5: Ependymoma Ependymal tumor after Maximal safe resection High-grade Ependymoma Low grade Ependymoma Anaplastic Ependymoma Post-operative adjuvant focal conformal RT 54Gy/30#/6wks Neuroaxis staging: MRI spine CSF cytology Positive MRI spine Negative MRI spine and/or CSF and CSF Treat like embryonal CNS tumor Post operative adjuvant focal conformal Radical Radiotherapy with CSI + local tumour boost + 59.4Gy/33#/6½ weeks 55.8Gy/31#/6wks in younger children and/or tumours in close adjuvant chemotherapy proximity to critical structures **Repeat Surgery** Progression Salvage chemotherapy

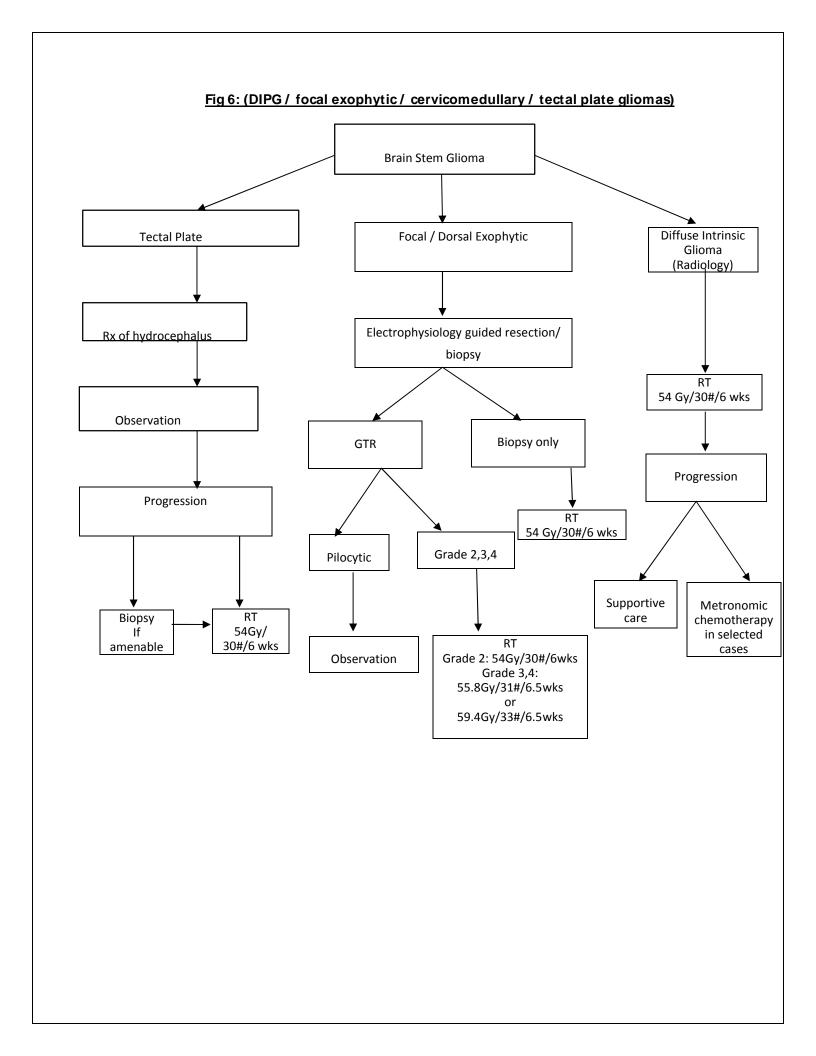
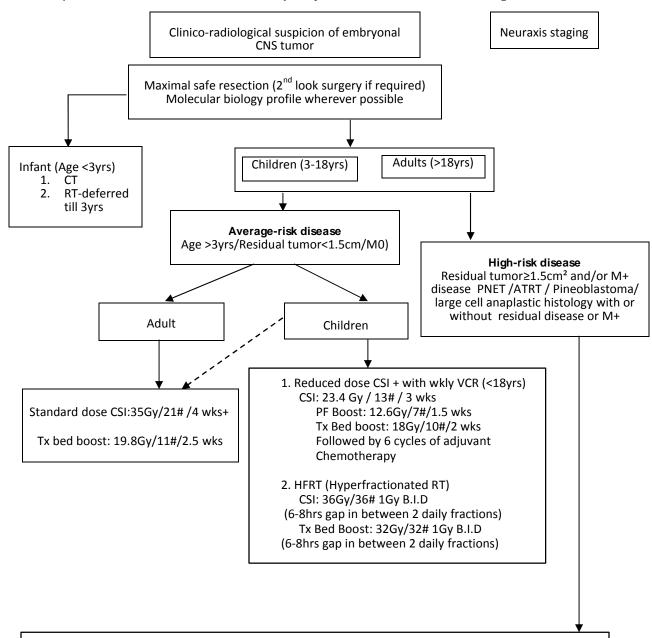


Fig 7: Primitive / Embryonal CNS tumours

(Medulloblastoma / PNET / ATRT / Ependymoblastoma / Pineoblastoma)



Standard dose CSI + Adjuvant Chemotherapy

CSI: 35 Gy / 21# / 4 wk and PF (MB) or tumour bed (PNET) boost: 19.8 Gy / 11# / 2.5 wks

(Boost to gross metastatic deposits: 5.4-9 Gy / 3-5#)

6 cycles of adjuvant systemic chemotherapy

Fig 8: Craniopharyngioma Craniopharyngioma Maximal safe resection Transcranial (preferable) Transshpenoidal(optional) GTR/NTR (no or small residue) STR (residual) <6yrs ≥6yrs Adjuvant focal Conformal RT-54 Gy/30#/6 wks **Close Observation** Adjuvant focal Conformal RT 54 Gy/30#/6 wks Progression OR Repeat Sx if feasible Direct RT followed by RT

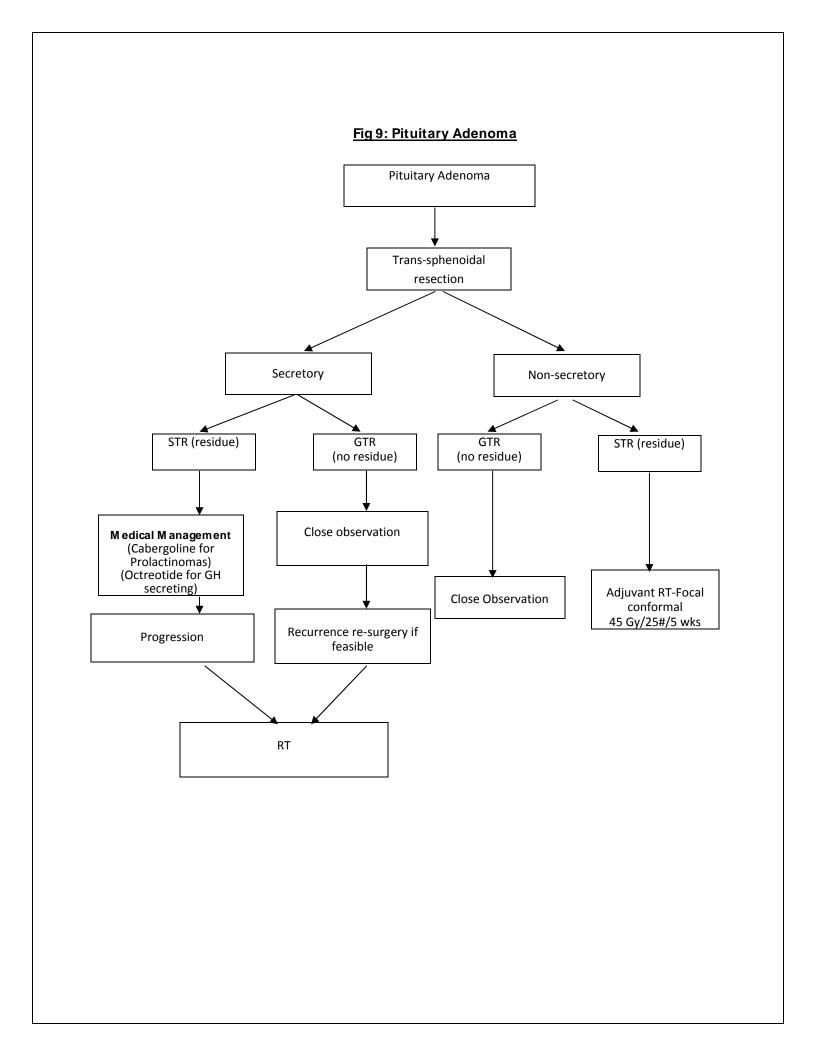


Fig 10: Imaging features of Meningioma or Variants including Hemangiopericytoma (HPC) Imaging features of Meningioma or Variants inclusive of HPC Non eloquent area Eloquent area (optic nerve sheath) Maximal safe Not amenable to Bx Вх resection GTR (Simpson STR (Simpson Gr I-III) Gr IV-V) Grade I Grade II/III Direct RT 50.4Gy to 54 Gy/ 28-30# Grade I Grade I Grade II/III Grade II/III Adjuvant RT Adjuvant RT 50.4Gy to 54 Gy to 54 Gy/ 59.4 Gy/ 28-30# Adjuvant RT Adjuvant RT Observe 30-33# Adjuvant RT 59.4Gy/33#/ 59.4Gy/33#/ 54Gy/30#/ 6wks 6.5wks 6.5wks 60Gy/30#/ 60Gy/30#/ 6wkswks 6wks Recurrence Re Sx if feasible Adj RT 54Gy/30#/6wks RT= focal conformal radiotherapy **Image guided IMRT is preferred

Acoustic Shwannoma Audiometry Familial(Bilateral) Sporadic (Unilateral) (NF-2) On clinic-radiological surveillance Surgery Clinico-radiological progression GTR/NTR Residual Surgery not Surgery contemplated contemplated/not feasible Small Large Observe Surgery (more Observation for less affected ear) affected ear RT Observe Close RT observation 54 Gy/30#/6wks Progression Progression RT 54 Gy/30#/6wks 54 Gy/30#/6wks IMRT is preferred over conformal RT Released Date: April 2017 National Cancer Grid

Fig 11: Acoustic Shwannoma

