

Advanced MR Imaging in High Grade Glioma

Clinical presentation: Headache, irrelevant talks and gait disturbance since past two months.

Imaging findings:

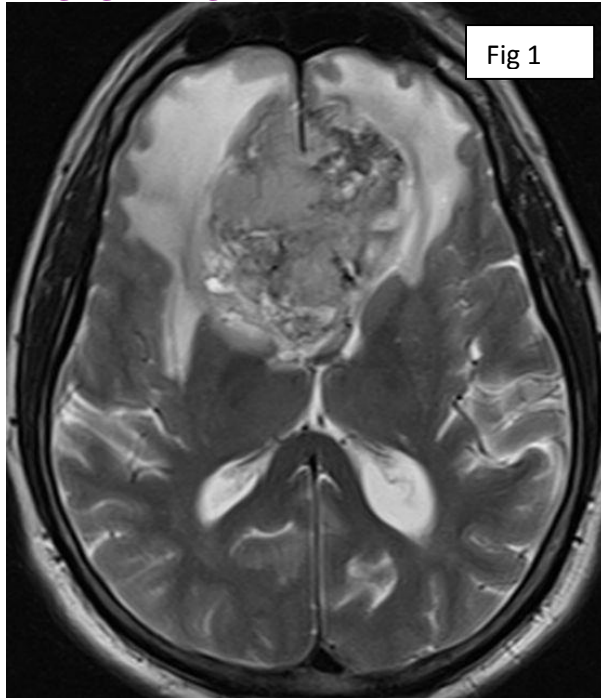


Fig 1

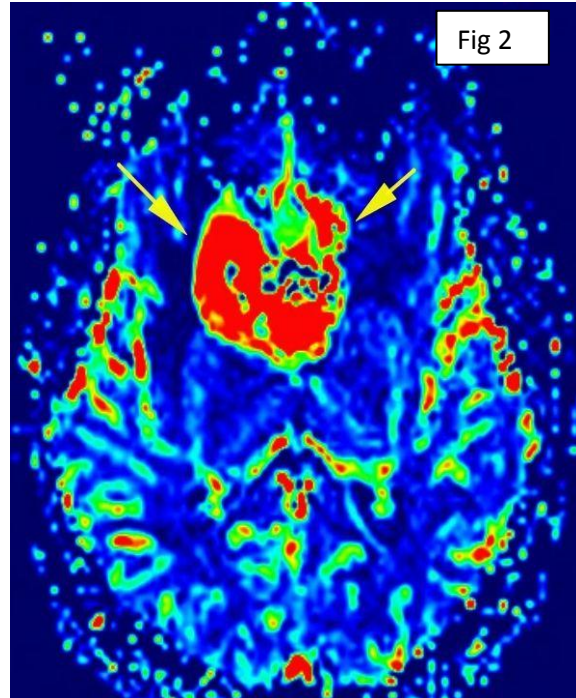


Fig 2

Fig 1 T2WI: Lesion with infiltrative margins involving both frontal lobes, rostrum, genu of corpus callosum, showing mixed signal intensity with multiple prominent vessels within and adjacent edema.

Fig.2 Perfusion imaging: Areas of hyperperfusion (red area marked with yellow arrows) are seen in the lesion and the rCBV values are raised, varying from 15.7 to 18.7.

Fig 3, 4: MR Spectroscopy at long TE shows marked increased levels of choline, reduction in the NAA levels. Lipid lactate peak is seen at places.

Fig 5; T1W sagittal post contrast: Post contrast study, showing heterogeneous enhancement in the lesion, with small non-enhancing necrotic components.

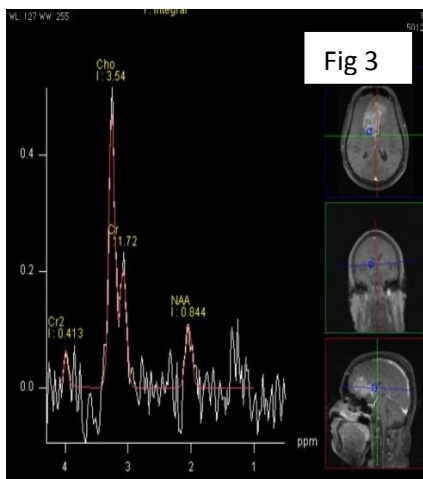


Fig 3

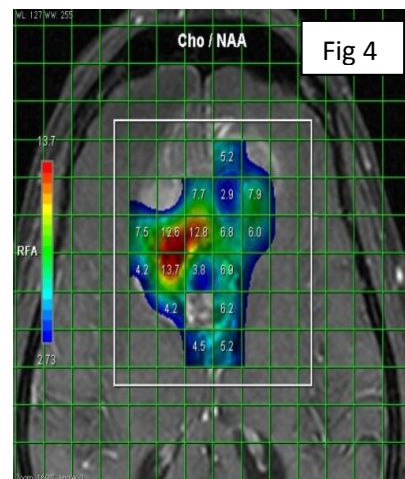


Fig 4

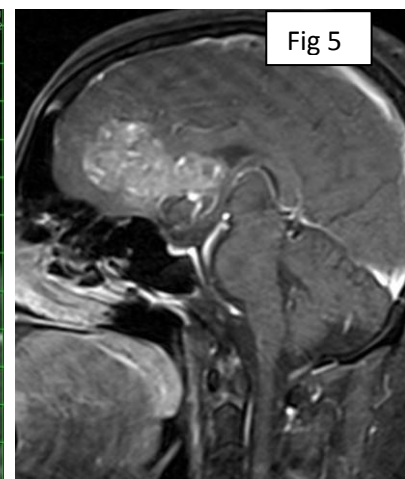


Fig 5

Diagnosis: High grade glioma - Glioblastoma (GBM)

Discussion:

Glioblastoma (GBM) is the most common adult primary intracranial neoplasm. These are high grade tumors and have a tendency to spread along the condensed white matter tracts such as corticospinal tracts and corpus callosum.

Routine MR sequences show the tumors to have infiltrative margins. It shows hyperintense to mixed signal intensity on T2WI, low signal intensity on T1WI, restricted diffusivity and shows foci of microbleeds on GRE.

Spectroscopy, on the other hand, detects the concentration of some metabolites, always in specific lesion areas. The glioma malignancy grade is directly proportional to the choline peak (which is produced during the synthesis of biological membranes and is, therefore, a marker of replicating cells) and is inversely proportional to that of N-acetyl aspartate which, instead, is a marker of normal neurons. For this reason the glioma malignancy grade is directly proportional to the Cho/NAA ratio. Tumefactive demyelination and infective processes can show similar imaging features. Spectroscopy detects the presence of lactate as a necrosis marker.

Perfusion imaging provides brain vascular maps that identify cerebral tissues on the basis of several hemodynamic parameters. The parameter that most effectively relates to histological characteristics of cerebral gliomas is rCBV (relative cerebral blood volume), that is proportional to the volume of microvessels supplying an area of interest. In this case, therefore, the malignancy grade is proportional to the density of the lesion's microvessels.

Conclusion:

Both perfusion and spectroscopy imaging can be useful to detect the lesion malignancy grade, in addition to identifying accurately the most malignant part of the lesion for a proper biopsy sampling. Perfusion can be used as a problem solving technique in equivocal cases as well as to confirm radiological suspicion.

Regards,

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N.B: This case is authentic and from the archives of **Radiance Diagnostics**. For any queries/suggestions/feedback write to us at radiance@radiancediagnostics.in . Case of the month can also be accessed anytime online at **VIEW BOX** at www.radiancediagnostics.in