Case report:

Advanced MR imaging of glioblastoma multiforme

Partha Sarathi Sarkar[1], Sankar Neelakanthan [2],Debadatta Hajari [3], Babu Philip [4]

[1] Senior resident in Department of Radiology, ST. Johns Hospital, Bangalore

[2] Senior resident in Department of Radiology, ST. Johns Hospital, Bangalore

[3] Senior Resident in Department of Medicine, ST. Johns Hospital, Bangalore

[4] Professor in Department of Radiology, ST. Johns Hospital, Bangalore

Corresponding author : ParthaSarathi Sarkar

Abstract

We present a case of 68 year old patient who case come to St John's Hospital, Bangalore with complains of chronic persistent refractory headache.A MRI scan was done which revealed a heterogeneously enhancing mass lesion in right parieto-occipital region, which on spectroscopic analysis was diagnosed as GlioblastomaMultiforme

Keywords: GlioblastomaMultiforme, MRI,Headache

Case report:

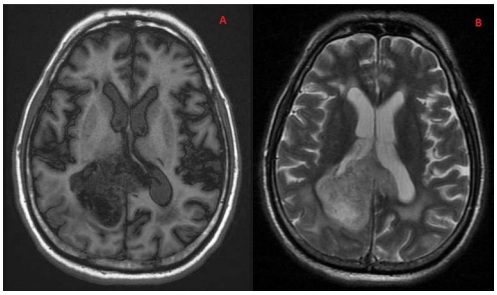
A 68 year old gentleman presented to the emergency department with headache. He had no known co-morbidities. His general physical and neurological examination was normal. He underwent an emergency.

MR screening showed a T1 heterogenously hypointense, T2 heterogenously hyperintense (fig1) lesion involving the subcortical and deep white matter of the right parieto-occipital region. The lesion was noted to infiltrate across the midline through the splenium of corpus callosum. Perilesionaloedema was noted causing regional sulcal effacement. A focal area of diffusion restriction noted in the infero-medial aspect of the lesion suggestive of high cellularity zone (fig2). Tiny intralesional foci of blooming were noted suggestive of microbleeds (fig3). Post contrast T1 weighted fat saturated images showed evidence of peripheral heterogenous enhancement (fig4).

Single-voxel MR spectroscopy shows elevated choline, lactate, lipid peaks and decreased NAA peak in the intralesional (fig5) and perilesional (fig6) regions of the tumor. In addition , Choline : NAA ratio was 1.7, Choline : Creatinine ratio was 2.4 and NAA : Creatinine ratio was 1.41 in the intralesional voxel and Choline : NAA ratio was 2.29, Choline : Creatinine ratio was 1.36 and NAA : Creatinine ratio was 1.68 in the perilesional voxel.

He was diagnosed to have high grade glioma which was confirmed on histopathology.

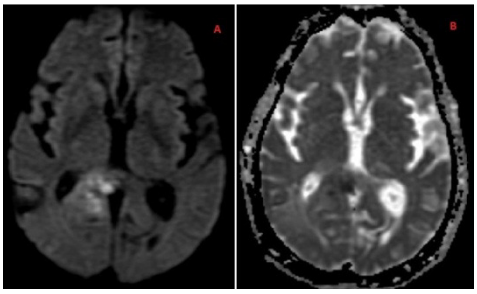
Figure 1:



A- Axial T1 weighted MR image showing a heterogenouslyhypointense lesion involving the right parieto-occipital white matter.

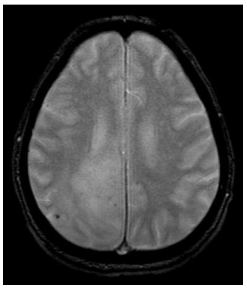
B- Axial T2 weighted MR image showing a heterogenouslyhyperintense lesion involving the right parieto-occipital white matter with perilesionaloedema.

Figure 2:



A- Axial Diffusion weighted MR image and B- Apparent diffusion coefficient map showing focus of restriction within the lesion postero-lateral to the splenium.

Figure 3:



T2 weighted gradient recalled ECHO image showing intralesional foci of blooming.

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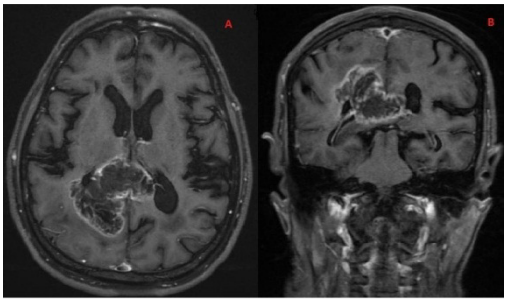
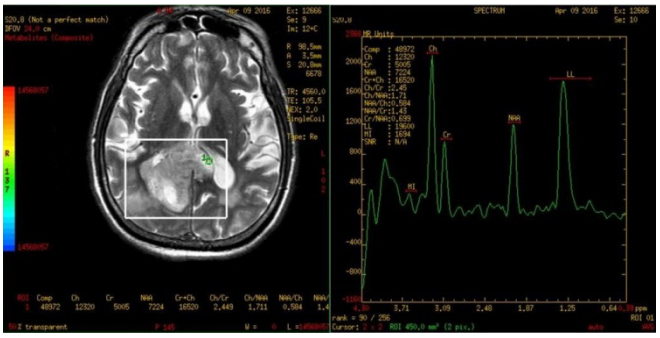
Figure 4:



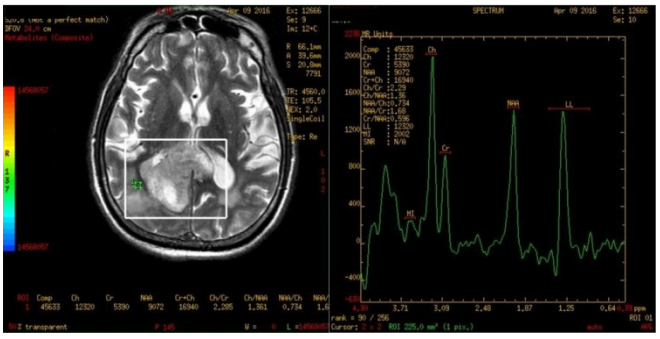
T1 weighted post contrast fat saturated images A- Axial sections and B- coronal sections showing peripheral heterogenous enhancement with infiltration across the midline through the splenium of the corpus callosum.

Figure 5:



Intralesional single voxel MR spectroscopy images showing elevated choline, lactate, lipid peaks and decreased NAA peak with elevated Choline : NAA and Choline : Creatinine ratios and decreased NAA : Creatinine ratio.

Figure 6:



Perilesional single voxel MR spectroscopy images , showing elevated choline, lactate, lipid peaks and decreased NAA peak with elevated Choline : NAA and Choline : Creatinine ratios and decreased NAA : Creatinine ratio.

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Discussion

Glioblastomamultiforme (WHO grade IV astrocytoma) is the most common primary brain malignancy, accounting for upto 15% of all intracranial neoplasms. It occurs most commonly in elderly population (mean age of 55 years) and is frequently supratentorial in location.[1]

An existing astrocytoma may dedifferentiate into a high grade glioma, in which case they are secondary glioblastomas. These tumors are occur in a younger patient population (mean age of 40 years) and have a worse prognosis.[2]

They are high grade tumors that have classical MR imaging features as described in our patient.

In MRS, elevated choline and reduced NAA suggest tumor turnover and neuronal loss; metabolite ratios (choline-creatine, choline-NAA, NAAcreatine, myoinositol-creatine) correlate with tumor grade.[3]

Conclusion

Glial tumors are the most common primary malignancy of CNS. MRI plays an important role not only in diagnosis, but pre-operative evaluation. Recent advances in functional MR like MR spectroscopy can help not only in differentiating benign from malignant, primary neoplasm from metastases but also helps in determining the grades of the tumor.

Learning points

1. Glioblastomamultiforme is the most common primary brain tumour, , accounting for upto 15% of all intracranial neoplasms.
2. MRI is the imaging modality of choice in the evaluation of gliomas, and can accurately detect the grade tumours.
3. MR spectroscopy is a useful problem solving tool to grade gliomas; to differentiate them from other intra axial lesions like metastasis; to delineate peritumoralmicroinfiltration, and to aid in pre-operative mapping.

References

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