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Oligodendroglioma

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A. CASE TITLE: Oligodendroglioma

B. CLINICAL HISTORY: A 39 year old male patient presented to our institute with one episode of GTCS and post-ictal headache. No other relevant history was present, no similar complaints were present in the past and no comorbidities. On examination, neurological examination was within normal limits. Blood-work up was also within normal limits.

C. IMAGING:

CT BRAIN PLAIN AXIAL, SAGITTAL & CORONAL VIEWS (Fig. 1): Relatively well defined irregularly marginated hypodense lesion measuring 14 x 13 mm noted in the right frontal lobe with plain CT value of 8-12 HU with marginal hyperdensities (plain CT value of 45 – 50HU). Adjacent perilesional edema noted causing mild effacement of adjacent sulcal spaces.

Figure 1 – Axial plain CT Brain

MRI BRAIN AXIAL T1, T2, FLAIR, DWI, ADC, gradient echo T2*, Axial & sagittal contrast enhanced T1 and MR spectroscopy (Fig. 2, 3, 4, 5, 6, 7, 8 and 9): Well-defined lobulated cortical based mass lesion noted in right frontal lobe measuring 44x 47x 45mm (APx TRxCC) extending upto the body of corpus callosum on right side. Lesion appears hypointense on T1WI, hyperintense on T2WI with

central area of ring hypointensity showing blooming on GRE sequence with no diffusion restriction. Anterior component of lesion is bubbly and cystic whereas medial and posterior component of the lesion is solid in nature. T2-FLAIR mismatch noted. Peripheral hyperintense rim is seen on FLAIR sequences. Minimal enhancement of the solid component on post contrast images is seen.

MRS: Shows decreased NAA with raised Choline peak. CHO: NAA – 2.2. There is e/o persistent small peak at 2.5ppm- ? Hydroxy-glutarate peak.

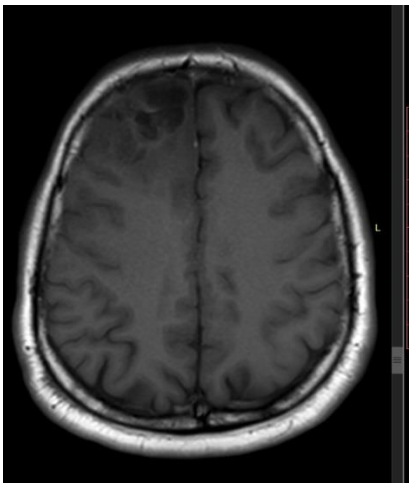

Figure 2 – Axial T1

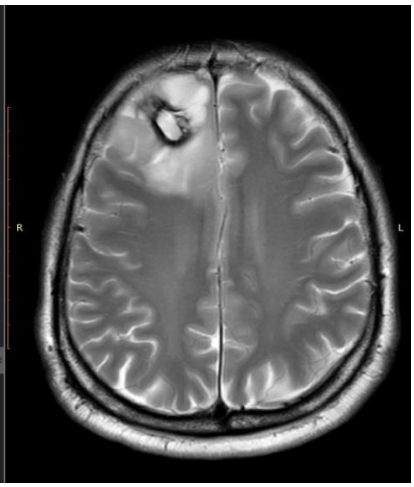

Figure 3 – Axial T2

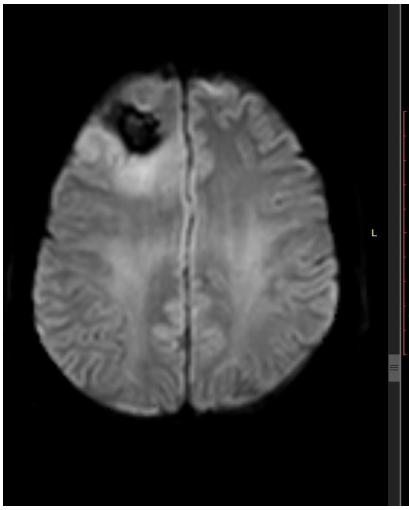

Figure 4 - DWI

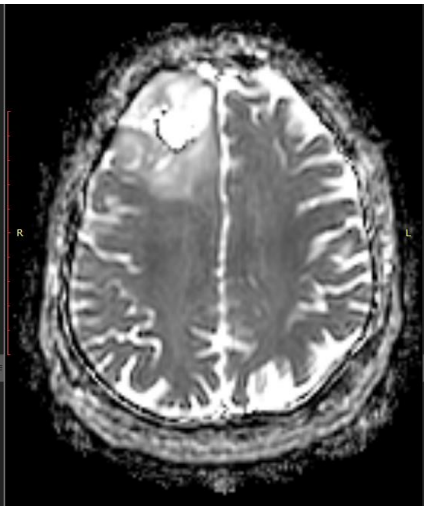

Figure 5 – ADC

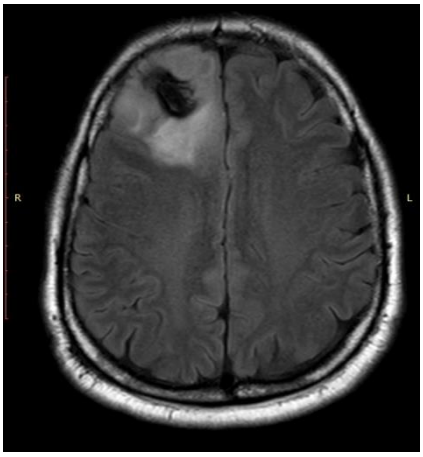

Figure 6 – Axial FLAIR

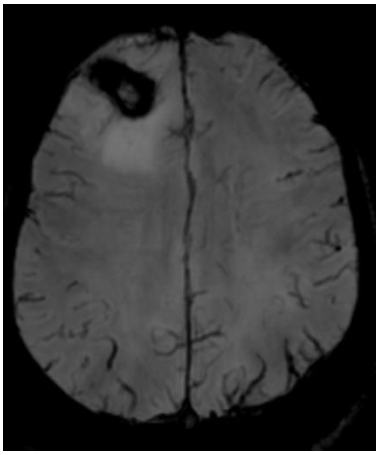

Figure 7 – Gradient echo T2*

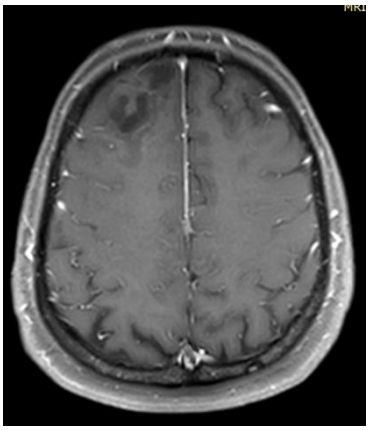

Figure 8 – Axial contrast enhanced T1

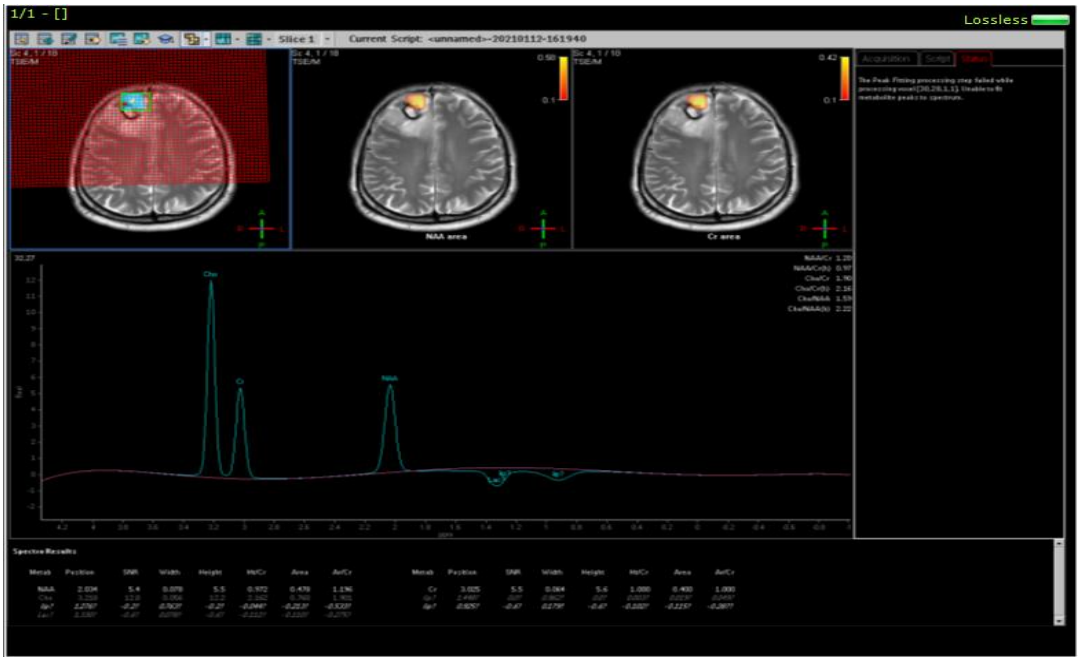

Figure 9 – MR spectroscopy

D. **Diagnosis:** Low grade neoplasm – ? Oligodendroglioma.

E. DISCUSSION:

Epidemiology

- Based on the CBTRUS statistical report: NPCR and SEER, 2007-2011, in a cohort of 95,564 patients of all age groups and in 10,274 children & adolescents (0-19 years) oligodendrogliomas represented ~5.9% and 2.5% respectively of glial tumors of the CNS[1].
- Oligodendroglioma is graded by WHO into grade II and grade III [2]. In grade II oligodendroglioma the median age of diagnosis was 41 years with no gender predisposition[2].

Pathogenesis

- Based on the WHO classification of CNS tumors 5th edition (2021), diagnosis of oligodendroglioma requires the status of IDH mutant with 1p/19q co-deletion.

General features

- They are well-defined round/ oval intra-axial mass lesions which are in the cortex and subcortical white matter[3].
- Most common presentation is seizures. In GTCS most likely location is mesial frontal lobe which includes cortex with fibres connected to the genu of corpus callosum. In partial seizures, location is in temporal & orbito-frontal lobes which spares the cortex and connected to the genu.
- The typical fried egg appearance of the individual cells is observed in tumor cells[4].

Imaging

- **CT Findings[3]:**
    - **Location:** Usually cortical based and peripheral with expansion of the gyrus focally and there can be thinning & remodelling of adjacent skull.
    - **Appearance:** 2/3rd – hypodense. 1/3rd - mixed density.
    - **Calcification:** Majority shows calcification (~70-90%) which can be coarse nodular or clumped calcifications. Gyriform calcifications is more specific.
    - **Degeneration:** Cystic in ~20% cases. Gross haemorrhage and perilesional oedema are less common, however does not suggest malignant degeneration.
    - **Enhancement:** Nil to moderate with only 50% of tumors showing enhancement. Multifocal patchy enhancement is more likely to suggest diagnosis.
- **MR Findings[3]:**
    - **Appearance:** Hypointense to gray matter on T1WI and heterogeneously hyperintense on T2/FLAIR.
    - **Calcification:** Foci of blooming on T2*.
    - **Diffusion:** No restriction.
    - **Enhancement:** Many don’t enhance, but ~50% show moderate enhancement.

- **MRS:** Moderate elevation of the Cho: NAA ratio with an additional peak of 2-HG (2-hydroxyglutarate) at 2.25ppm.
- **Perfusion MR:** When low grade oligodendroglioma is compared to an astrocytoma of the same grade, the oligodendroglioma demonstrates high rCBV values. High rCBV values is due to the presence of "chicken wire" vascularity.

Histopathological diagnosis : Anaplastic oligoastrocytoma , WHO grade lll.

REFERENCES:

1. Ostrom QT, Gittleman H, Liao P, Rouse C, Chen Y, Dowling J, Wolinsky Y, Kruchko C, Barnholtz-Sloan J (2014) CBTRUS statistical report: primary brain and central nervous system tumors diagnosed in the United States in 2007-2011. Neuro Oncol 16(Suppl 4):1–63.
2. Alattar A, Brandel M, Hirshman B, Dong X, Carroll K, Ali M et al. Oligodendroglioma resection: a Surveillance, Epidemiology, and End Results (SEER) analysis. Journal of Neurosurgery. 2018;128(4):1076-1083.
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4. Wesseling P, van den Bent M, Perry A. Oligodendroglioma: pathology, molecular mechanisms and markers. Acta Neuropathologica. 2015;129(6):809-827.