

*Case Report*

Ganglioglioma of Central Nervous System- Study of 3 Cases- with Review of Literature

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ABSTRACT

Gangliogliomas are rare tumors of central nervous system accounting to 0.4% of total CNS tumors. Gangliogliomas are more common in temporal lobe (85%). We present three cases of ganglioglioma of CNS. Case 1: A 52-year-old Female presented right thalamic tumor operated by microneurosurgical technique through transcollosal approach and diagnosed as thalamic ganglioglioma, grade I on histopathology. Case 2: A 45-year-old female with history of seizures operated by microneurosurgical technique through right temporal craniotomy and diagnosed as right temporal lobe ganglioma grade I. Case 3: 9-year-old female child presented with headache, neckpain, vomiting and left posterior parieto-occipital transcortical craniotomy and diagnosed as thalamic ganglioglioma grade III. Immunohistochemical stains were performed to confirm the same, which were GFAP, CD34, Synaptophysin, S-100 and MIB-1, Ki-67.

Key Words- Ganglioglioma, CNS, Microsurgery, Immunohistochemistry

INTRODUCTION

Gangliogliomas also known as gangliocytomas, ganglioneuromas. Ganglioglioma is a tumor that arises from ganglion cells in central nervous system. [1] Gangliogliomas are rare, slow growing, benign neoplasms of CNS affecting usually older children and young adults. These are tumors frequently occur in children and young adults. They present less than 1% of all primary brain and about 4% of all pediatric tumors.

It occurs most commonly in the supratentorial, mostly in the temporal lobe (85%) of cerebral hemisphere of the

brain presenting with intractable seizures. [1-4]

They also occur in the frontal lobe, parietal lobe, occipital lobe, and regions of thalamus and third ventricles. They may also occur in cerebellum and the spinal cord. Cases of brainstem ganglioglioma have also been noted. They usually present as seizures. Diagnosis can be made on MRI or CT scans as cyst formation and calcification (mineral deposits) may be present in some cases.

CASE REPORTS

Case Report 1:

A 52-year-old female came to our hospital with complaints of seizures,

insomnia, loss of taste and loss of balance and slurred speech over a period of 2 months. On neurological examination patient had neck spasm.

MRI with contrast showed a well defined nodular area involving the right thalamus minimally extending into the midbrain on the right measuring approximately 28x25x24 mm showing a thin enhancing wall rim measuring 2-3mm in thickness which appears minimally hypotense on T2, hypertense on FLAIR sequence, cystic components appearing hyperintense to CSF on T2 and FLAIR sequence, internal enhancing solid component measuring approximately 18x6x16mm with perilesional edema involving thalamus and right half of midbrain. Mass effect noted in form of significant compression and deformation of third ventricle and aqueduct causing mild obstructive hydrocephalus. (Figure1)Then the patient underwent surgery by transcollosal approach and the tumor was resected totally.

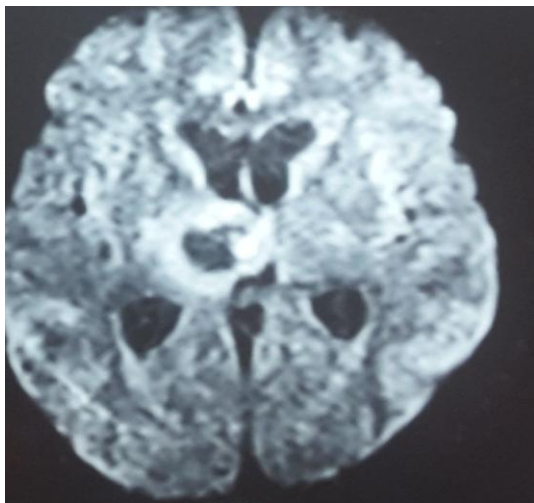


Figure 1: MRI reveals a well defined nodular,soft to cystic areas involving the right thalamus

GROSS: We received multiple, irregular grey-white to grey-yellow, soft tissue pieces aggregating to 2.5x1.8x0.8cm.

Histopathological examination revealed a ganglioglioma- low grade,

grade1. The tumor was composed of glial cells as wells as ganglion cells. The ganglion (neuronal) cells were large, dysmorphic, polygonal with large, round to ovoid vesicular nuclei and prominent nucleoli in some. Some of these cells exhibited binucleation and some were giant cells. Eosinophilic granular bodies were occassionally noted. The glial component was low grade. A diagnosis of ganglioglioma was made on light microscopy and immunohistochemistry was performed to confirm the same. The ganglion cells were positive for CD 34(Fig 4), S100 (Fig 5), Synaptophysin (Fig 6), GFAP (Fig 7).The MIB-1(ki-67) labelling was 2-3% (Fig 8).Thus, the diagnosis of was confirmed as ganglioglioma grade1.

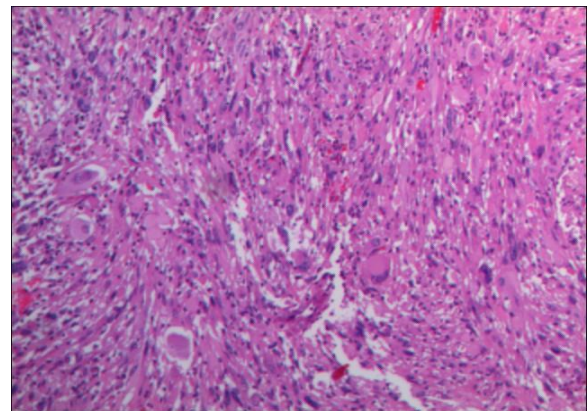


Figure 2: Microphotograph of H&E stain-low power showing presence of dysmorphic ganglion cells & glial component.

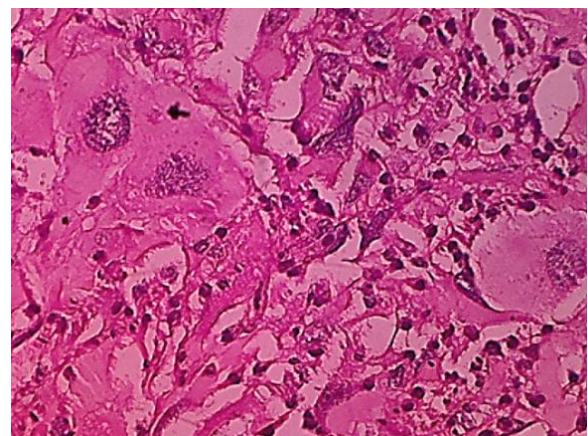


Figure 3: Microphotograph of H&E stain-high power showing presence of dysmorphic ganglion cells & glial component.

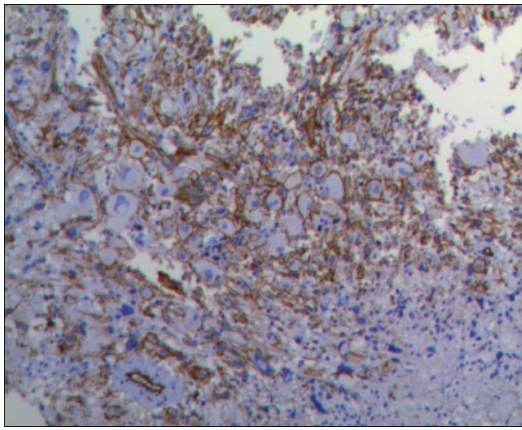


Figure 4: Microphotograph of CD34 showing positivity for ganglion cells.

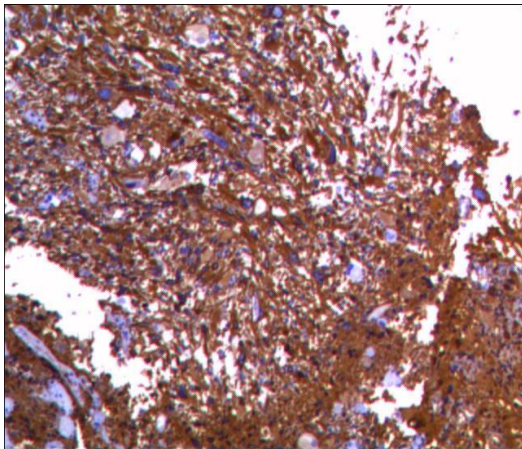


Figure 5: Microphotograph low power view of S100 immunostain staining positive for neuronal component.

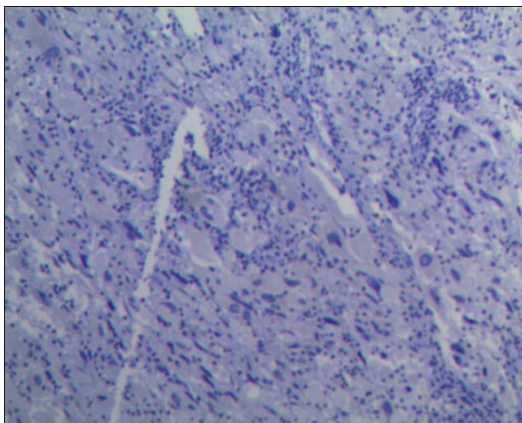


Figure 6: Microphotograph low power view of Synaptophysin immunostain staining focal positivity for neuronal component.

lesion of altered signal intensity in the right temporal region anteriorly including the right hippocampus and parahippocampus region. Showing heterogenous T1 weighted images with a prominent hypointense mild hyperintensity. On T2 weighted images, heterogenous signal was seen in this region with irregular hyperintense component and surrounding hypointensity. The hypointense components are defined on the gradient echo-sequence –suggestive of calcification. She was operated for right temporal craniotomy with total excision of tumour. Post operative she was stable no any deficit.

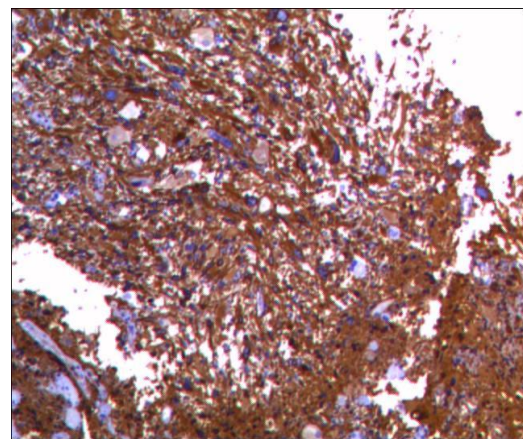


Figure 7: Microphotograph low power view of GFAP immunostain staining positive for the glial component.

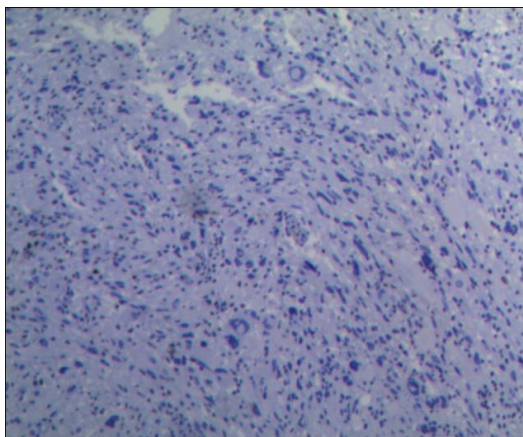


Figure 8: Microphotograph low power view of Mib-1 Immunostain staining positive for the glial component.

Case Report -2: A 20-year-old female presented with neck pain with headache followed by slurred speech, ataxia and seizures. She had no any neurodeficit. MRI was done revealing a fairly large, irregular

Histopathological study revealed a ganglioglioma low grade, grade 1 which was confirmed by immunohistochemistry by CD 34, S100, Synaptophysin, GFAP came

positive and MIB-1(Ki-67) less than 1%. (Figures 2).

Case 3.A-9-year-old female child presented with the history of headache, neck pain, vomiting in OPD with no any neurodeficit. CT Scan revealed a solitary, poorly demarcated heterogeneously hypotense intra-axial SOL measuring about 5.9cm (Crano-caudal) x 5.6cm(AP) x 5.1cm (transverse) was noted in the left thalamo-capsular region extending to corona radiata and centrum semiovale. Multiple, irregular, hypodense fluid attenuation areas noted within (HU17-20)? Necrosis /cystic. She was advised surgery. Later she was brought unconscious with a GCS of 4/15. She was operated on an emergency basis on the same day for left posterior parieto-occipital transcortical craniotomy with total excision of the tumour. Post-operative patient gradually improved with GCS-14/15 and had right hemiplegia.

On histopathology, a diagnosis of high grade glial tumor was made which was confirmed on immunohistochemistry as ganglioglioma, grade III. The glial component showed anaplastic change with pleomorphism. Oligodendroglial component was also present. Necrosis was observed. The ganglion component was confirmed by CD34, synaptophysin and S100. The MIB-1 index was high 10%.

DISCUSSION

Ganglioglioma accounts for 0.4-7.6% of paediatric CNS tumor and up to 1.3% of those in adults. The supratentorial cortical lesions are characterised by long history of seizures where as posterior fossa gangliogliomas feature focal neurological deficits, cranial nerve palsy, hydrocephalus, increased intracranial pressure, speech or gait changes and myoclonus. The gangliocytoma and ganglioglioma need to be differentiated as the gangliocytoma lacks or has negligible glial component. The glial component in ganglioglioma could be

variable but usually consists of pilocytic astrocytes with mild nuclear pleomorphism. Even though glial cells are usually of astrocytic nature, an oligodendroglial component in ganglioglioma has also been described. Large neuron cells, often polygonal in shape, possessed round to ovoid, centrally situated nuclei and eosinophilic, usually prominent nucleoli. Binucleate neurons may be noted. Neuronal cytoplasm was often amphophilic. Eosinophilic globular bodies may be found in the cytoplasm as were clear vacuoles. [5,6] Ependymoma having glial component has been recently described. [7] Gangliocytoma and ganglioglioma display a patchy reticulin network of thick hyalinised vessels and focal lymphocyte infiltrates, particularly around blood vessels and variable calcification. The ganglioglioma is composed of mixture of randomly arranged multinucleated ganglion cells and glial component. [8]

The prognosis is excellent for gangliocytoma even if partially resected. For ganglioglioma the prognosis depends on the extent of resection and behaviour of glial component. The component can also have anaplastic features. [9,10]

The important differential diagnosis is dysembryoplastic neuroepithelial tumor (DNT) and pleomorphic xanthoastrocytoma. Immunohistochemically, many neuronal cells were positive for synaptophysin (100%), Class 3 beta-tubulin (100%), neurofilament protein (90%), and chromogranin A (86%), in addition to S-100 protein (71%) and, occasionally, vimentin (24%). Ultrastructural characteristics of neuronal cells included the presence of numerous, 100-230-nanometer dense core granules within both perikarya and cell processes, well developed rough endoplasmic reticulum, microtubules within cell processes, and synapses associated with clear vesicles. Astrocytic cells usually contained abundant intermediate filaments;

their cell membranes, when abutting the stroma, were covered by basal lamina. [11]

Almost 80% of gangliogliomas reveal immunoreactivity for CD34, a stem cell epitope not expressed in normal brain. [12] Mib(Ki-67) labelling is done to grade the glial component.

The 3-tiered classification of ganglioglioma has been abandoned in 2007 WHO classification, which distinguishes benign WHO grade I and anaplastic WHO grade III ganglioglioma. From the clinical point of view, extra-temporal location, male gender, age at surgery more than 40 years, a history without epilepsy, incomplete tumor resection and histological presence of gemistocytic cell component have been identified as poor prognostic outcome parameters. [13]

CONCLUSION

Gangliogliomas are usually low grade tumors. However, anaplastic element may be found depending on the glial component. Grade I gangliogliomas have excellent prognosis as compared to its anaplastic counterpart. Gangliogliomas show immunohistochemical positivity for CD34, S100, synaptophysin, GFAP. Mib-1 labelling is done to grade the glial component.

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