After Long Term Electroconvulsive Therapy, Gliosarcoma with Primitive Neuroectodermal Tumor-like Components: A Case Report

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Abstract

We present a rare case of gliosarcoma (GS) with primitive neuroectodermal tumor (PNET)-like components. A 63-year-old female patient with right-sided weakness for the last five months. In her medical history, she has schizophrenia and has antipsychotic treatment and electroconvulsive therapy (ECT) for 30 years. In her cranial MRI, there is a 56x50x46 mm cystic mass lesion with superior nodular solid components at the posterior of the central sulcus of the left parietal lobe. By examining the histomorphological and immunohistochemical findings of the cranial surgery material, the case was found consistent with GS with PNET-like components according to the WHO 2007 grade. When assessing the causes of GS, there are some aspects restricting to study of GS with PNET-like components because GS is a rare tumor and GS with PNET-like components is very rare tumor. There were reported that primary and secondary GS cases have been associated with postradiation therapy. However, as in our case, there has not been found an evidence that long term ECT causes GS. It is thought that if long term ECT causes GS.

Keywords: Gliosarcoma; PNET-like; Glial Tumor; ECT

1. Introduction

Gliosarcoma (GS) is a variant of glioblastoma multiforme (GBM), a rare primary malignant neoplasm of the central nervous system. GS a biphasic tumor and has two components including sarcomatous and gliomatous in its histopathology. First reported in 1895 by Strobe (Strobe, 1895). Subsequently it was described in detail in 1955 by Feigen and Gross (Feigen and Gross, 1955). GS is presenting in 2 % of all glioblastoma cases. It is usually more common in males and an average age at presentation is 52 years (Yachnis and Rivera-Zengotita, 2014). GS has a similar poor prognosis.

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when compared with classic glioblastoma. It has similar genetic, clinical and prognostic features with GBM. However, GS shows a distinct clinicopathologic behavior at several points, these are peripheral location on cerebral lobes, tendency for dural attachment, resemblance to meningiomas, tendency to produce intra or extra cranial metastasis and a poor survival (Damodaran et al., 2004). GS is a rare malignant tumor of the CNS and GS with primitive neuroectodermal tumor (PNET)-like components is very rare tumor, have reported usually as single case reports (Perry et al., 2009).

2. Case Report

We presented that a 63-year-old female patient with the complaints of headache, confusion and right-sided weakness for the last 5 months was admitted to hospital. In her medical history, she has type 2 diabetes, schizophrenia, depression and has oral antidiabetic (metformin) and antipsychotic treatment for the first 15 years haloperidol and for the last 15 years chlorpromazine therapy and intermittently electroconvulsive therapy (ECT) for 30 years. It was interpreted that the complaints of the patient were due to psychosis and it was not considered any further cranial imaging was necessary. The patient's general condition is good, conscious, semi-cooperative, non-oriented and the physical examination was normal. In neurological examination; pupils were isochoric, direct and indirect light reflexes were positive for both eyes. Distal right upper extremity strength was 0/5, proximal 2/5, and distal right lower extremity strength was 2/5, proximal 3/5 and other findings were normal. Laboratory findings were within normal limits. In her cranial MRI, there was a 56x50x46 mm cystic mass lesion with superior nodular solid components at the posterior of the central sulcus of the left parietal lobe. After intravenous contrast agent, cyst wall and solid components were enhanced with the contrast intensely. Generalized edema was present around the lesion and brain edema was extended the frontal and temporal lobes. The left lateral ventricle has been compressed and it was observed the third ventricle and midline structures deviating to the right. The sulcus of the left parietal lobe disappeared due to convexity. Brain edema has been extended to the left side of splenium corpus callosum and the left pericallosal space (Fig. 1). The patient had craniotomy. Postoperative follow-up and general condition of the patient were good and the patient was discharged. The brain surgery material was macroscopically 4x3x2 cm in size cream-colored irregular pieces of tissue. In the histopathological examination by serial sections there was malignant tumor infiltration consisting of giant cells with large extension and spindle cells with sarcomatous appearance and malignant tumor cells infiltration with large and hyperchromatic nuclei, narrow cytoplasm by forming rosette-like structures as a secondary component (Figs. 2, 3). And also high mitotic activity, extensive necrosis and vascular endothelial proliferation were observed (Fig. 4). Immunohistochemically, it was shown that diffuse positive immunoreactivity with vimentin (Fig. 5A) and focal positive immunoreactivity with GFAP (Fig. 5B), OLIG2 (Fig. 5C), synaptophysin (Figs. 5D, 5E), chromogranin, SMA. Whereas there were not immunoreactivity with CD 99, osteonectin, CD34, pancytokeratin, desmin, ATRX, MGMT, p53, CD3, CD20 and TTF-1. The Ki-67 proliferation index with positive nuclear staining was 70-80% within small cells foci (Fig. 5F). After histopathologically and immunohistochemically examined, the case was consistent with high-grade glial tumors including undifferentiated pleomorphic sarcoma and PNET-like components or gliosarcoma with PNET-like components according to the WHO 2007 grade.
Fig. 1. Axial post-gadolinium T1 weighted image, peripheral rim enhancing mass lesion is seen in the left parietal region.

Fig. 2. Sarcomatous Areas (Low power, Hematoxylin-Eosin stain)
Fig. 3. Sarcomatous Areas (Medium power, Hematoxylin-Eosin stain)

Fig. 4. Necrosis, astrocytic vascular-endothelial proliferation with PNET foci (Medium power, Hematoxylin-Eosin stain)
3. Discussion

GS is a primary malignant tumor of the central nervous system characterized by biphasic glial and mesenchymal patterns and its histology and histogenesis was highly controversial. Immunohistochemical studies reveal the biphasic pattern of tumor. GFAP stains the glial component, whereas vimentin positivity is diagnostic for the spindled cells component as sarcomatous component. In our case, focal positive immunoreactivity with GFAP in glial cells and in the small cells foci and diffusely positive immunoreactivity with vimentin including also sarcomatous cells (Svaidler et al., 2012; Kun et al., 2015).

In recent studies, PNET-like components appeared as hypercellular nodules and PNET-like features including high nuclear to cytoplasmic ratios, hyperchromatic oval to carrot shaped nuclei, high mitotic-karyorrhexis indices, Homer Wright (neuroblastic) rosettes, desmoplastic/nodular grown pattern, positive immunoreactivity with neuronal markers such as NSE, synaptophysin. We observed in our case that PNET-like component had positive staining with synaptophysin and chromogranin. In study series, Ki-67 proliferation indices ranged from 30% to 100%. In our case, Ki-67 proliferation index with positive nuclear staining was 70-80% within small cells foci. Nuclear p53 expression was seen in 81% of cases, reactivity involving 5%-100% of tumor nuclei in both the glioma and the PNET-like components. Whereas positive immunoreactivity with p53 was not seen in our case (Perry et al., 2009).
There are some aspects restricting to study of GS because GS is a rare tumor and GS with PNET-like components is very rare tumor. We experienced a very rare variant of GS case with PNET-like foci. Recent studies have supported that the biphasic neoplasm may arise from a single progenitor clone rather than separate clones. Both glial and mesenchymal elements may be derived from a common neoplastic neuroectodermal progenitor cell (Boerman et al., 1996; Aktor et al., 2002; Kun et al., 2015).

The studies carried out to evaluate primary and secondary GS cases showed that therapeutic radiation has been consistently associated with the genesis of secondary GS (Perry et al., 1995; Singh et al., 2015). Postradiation GS cases has also been reported as a case report (Lieberman et al., 2001). And also another case was reported that the a 13-year-old female patient had radiotherapy for medulloblastoma. After 8 years, she had the second cerebral tumor excised and confirmed to be a GS (Malde et al., 2004). Understanding glial tumors and these variants, morphological and molecular features of these variants were reviewed via the studies. In one of those studies, 7 of the 32 cases of GS had secondary GS after patients underwent irradiation for GBM. However, untreated patients showed poor survival. Interestingly, although primary GS showed different features and patterns as malignant fibrous histiocytoma, fibrosarcoma or osteosarcoma; the postirradiated secondary GS showed features of fibrosarcoma. It is suggested that radiation prompted distinct differentiation patterns (Karsy et al., 2012).

In our case it is noteworthy that our patient has intermittantly ECT for long term in her medical history. There is not similar case associated with ECT as our case.

4. Conclusion

GS is a rare malignant tumor of the central nervous system including two components; glial and sarcomatous components. The etiology of GS and clinicopathology of GS and GS with PNET-like foci are still controversial. It is indicated that radiation therapy is associated with GS. However, as in our case, there has not yet been found an evidence that long term ECT causes GS. It is thought that if long term ECT causes GS. We presented with this rare tumor our suspicion whether ECT is associated with GS. Future studies will hopefully clarify the pathogenesis, clinical course and outcome of GS.

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Conflict of Interest

None

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