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CASE REPORT

Gliosarcoma of a Brain: A Challenging Diagnosis

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ABSTRACT

Gliosarcoma is a rare primary malignant tumour of the central nervous system. A 28-year-old radiographer without a history of neurological disorder, malignancy or trauma presented with unprovoked seizures. He was symptom-free for 3 years but developed relapsed. Computed tomography of the brain was consistent with anaplastic convexity meningioma which was identical via intraoperative findings. However, the final histology revealed gliosarcoma of the brain. He recovered well postoperatively without any neurological deficit and had completed adjuvant chemo-radiotherapy. He was asymptomatic during follow up with no tumour recurrence. Gliosarcoma with predominant sarcomatous component mimicking a meningioma has prolonged survival as compared to a case with predominant glioblastoma component. Hence, the discordance between clinical, radiological, intraoperative and histopathological findings is a challenge in establishing a diagnosis of gliosarcoma.

INTRODUCTION

Gliosarcoma is a rare primary malignant tumour of the central nervous system with reported cases of 0.59 – 0.76% of all adult brain tumours. It is a variant of glioblastoma describing a biphasic tissue component displaying glial and mesenchymal differentiation. Gliosarcoma constitutes approximately 2% to 8% of all glioblastoma[1]. The age distribution is equivalent to glioblastoma which occurs between the ages of 40 to 60. Rare cases may

occur in children, even in the very young. Males are more frequently affected. Gliosarcoma is usually located in the cerebral hemispheres, involving the temporal, frontal, parietal and occipital lobes, in decreasing order of frequency. It has abrupt symptoms reflecting tumour location and raised intracranial pressure[2].

The histopathological evaluation shows a GFAP-negative malignant mesenchymal component, which is important to distinguish gliosarcoma from glioblastoma with a florid fibroblastic proliferation (desmoplasia) in the presence of meningeal invasion. Reticulin stain reveals a biphasic tissue pattern consisting of reticulin-rich sarcomatous and reticulin-free gliomatous elements[2]. Gliosarcoma has a poor prognosis with an average of 4 months of survival in untreated patients. It may show prolonged survival after surgical excision combined with radiotherapy and chemotherapy[3]. Gliosarcoma that mimics meningioma histologically has been reported to have a more favourable prognosis[4]. We present here a case of gliosarcoma in a young adult with the clinical impression of anaplastic convexity meningioma that has a prolonged survival after treatment.

CASE PRESENTATION

A 28-year-old radiographer presented with two episodes of unprovoked seizure. He had no past medical history especially neurological disorder or family history of malignancy. He denied a history of trauma, fall, motor vehicle accident and fever. He had plain computed tomography (CT) brain done which showed normal findings. He was started on Tablet Sodium Valproate 400 mg twice daily. There was no further test done to investigate the seizure. He had defaulted his follow-up and medication subsequently.

He remained symptom-free for 3 years until the unprovoked seizure recurred. This episode of seizure was followed by an attack of severe headache 2 weeks after. He sought medical attention after 2 days of the headache. He experienced the headache on the parietal and periorbital region of both sides. It was throbbing in nature and worsened in the morning. There was nausea but no vomiting. There was no blurring of vision or other symptoms of neurological impairment. Upon presentation, he was conscious with no neurological deficit on peripheral and cranial nerves examination.

Contrast-enhanced CT brain revealed an intracranial right parietal mass with surrounding mass effect. Magnetic resonance imaging (MRI) of the brain showed a heterogeneous solid lesion on right parieto-occipital region measuring 4.5×2.9×5.4 cm which was gadolinium-enhanced. There was multi-age haemorrhage within the solid lesion with an adjacent rim enhancing, well-defined homogeneous cystic lesion measuring 3.3×2.3×3.2 cm, surrounded by the oedematous white matter. There was a midline shift to the right and mass effect with no dilation of ventricles. Right parieto-occipital craniotomy and excision of the tumour was performed by the neurosurgical team. The clinical impression was anaplastic convexity meningioma. There was no residual tumour seen on post-operative imaging.

Histopathological report of the tumour revealed an irregular piece of tissue measuring 50×45×20 mm with multiple areas of haemorrhage on gross examination. Microscopic examination showed a biphasic cellular tumour composed of glial and sarcomatous components (Figure 1A). The glial component exhibited pleomorphic astrocytic cells with palisading necrosis (Figure 2A) and endothelial hyperplasia or microvascular proliferation with glomeruloid in appearance (Figure 3A). The tumour cells were moderately pleomorphic, having round to oval nuclei, fine chromatin, some showed visible nucleoli and cytoplasm of indistinct cell border with numerous mitoses (Figure 4A).

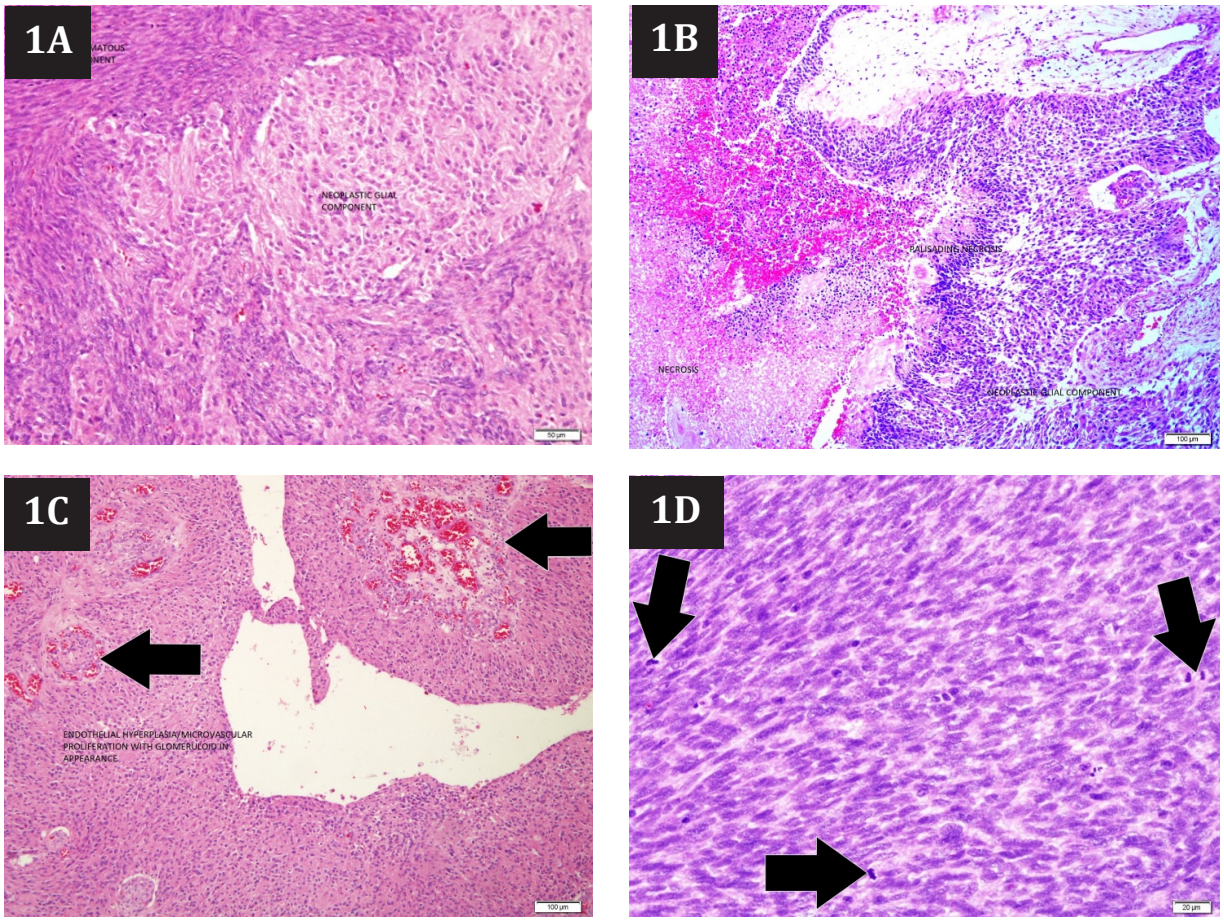

Figure 1 Photomicrograph: (1A) Biphasic cellular tumour composed of glial and sarcomatous components (H&E, ×20), (1B) Glial components with pleomorphic astrocytic cells and palisading necrosis (H&E, ×20), (1C) Endothelial hyperplasia or microvascular proliferation with glomeruloid in appearance (arrow) (H&E, ×10), (1D) Pleomorphic spindle cells with numerous mitosis (arrow) (H&E, ×40)

The tumour cells expressed Glial Fibrillary Acid Protein (GFAP) (Figure 2A), S-100 (Figure 2B) and Vimentin (Figure 2C) but did not express Epithelial Membrane Antigen (EMA), Progesterone Receptor (PR), E-cadherin, Pan Cytokeratin AE1/AE3, Cytokeratin 7, Cytokeratin 5/6 and Smooth Muscle Actin (SMA). Thus, a diagnosis of meningioma was excluded. Proliferative index Ki-67 was high (Figure 2D). Hence, the findings were in favour of Gliosarcoma, WHO grade IV.

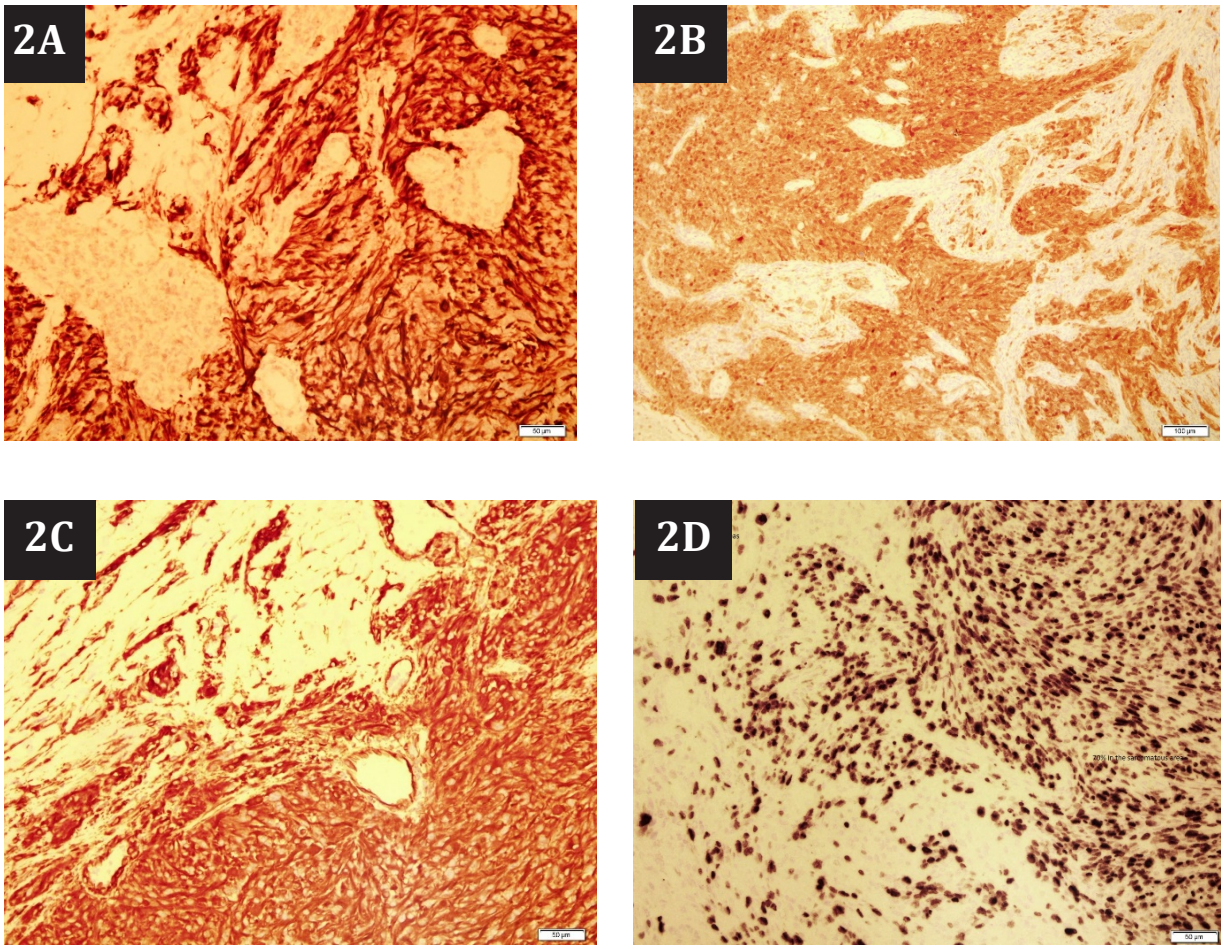

Figure 2 Photomicrograph: Tumour cells are positive for: (2A) GFAP, (2B), S-100, (2C) Vimentin with high Ki-67 proliferation rate, (2D) immunohistochemistry (×20)

The patient recovered well postoperatively and was asymptomatic. He was discharged 4 days after the operation. There was no neurological deficit. Adjuvant three-dimensional conformal radiotherapy (RT) and chemotherapy were given to the patient. He completed 6 cycles of adjuvant chemotherapy and was asymptomatic during follow up with no tumour recurrence. He was planned for surveillance with repeated MRI brain in every six months, or earlier if symptomatic.

DISCUSSION

Gliosarcoma was first described by Stroebe in 1895. It is an uncommon brain tumour and the reported incidence is 1 – 8% of all malignant gliomas and thus represents an exceptionally rare malignancy[1]. Recent genetic studies suggest a monoclonal origin of gliosarcoma and evolution of the sarcomatous component due to an acquisition of a mesenchymal phenotype in a highly malignant astrocytic tumour. Genetic aberrations, clinical features, and prognosis are similar to those of glioblastoma multiforme[5].

Gliosarcoma commonly occurs among elderly with rapid clinical manifestation. However, in this case, the patient is only 28 years old with a 3-year symptom-free interval after the first episode. It is generally supratentorial with the commonest site at the temporal region[1]. As described, the tumour location correlates well with this case. In the literature review, neuroimaging for gliosarcoma may have 2 types; a predominant sarcomatous

component that may mimic a meningioma or with a predominant glial component that gives similar radiological features to those of glioblastoma[2]. In this case, radiological and intraoperative findings were suggestive of an anaplastic convexity meningioma.

It was a challenging case because of the discordance between clinical radiological, intraoperative and microscopic findings in which clinically and radiologically are in favour of benign tumour. A preliminary diagnosis of anaplastic convexity meningioma made the histopathological evaluation more challenging, plus a predominant sarcomatous component was seen microscopically. Extensive immunohistochemical studies had been done to establish the diagnosis of gliosarcoma. Also, the patient's age and atypical clinical presentation made the differential diagnosis in favour of a benign tumour. However, since our patient was a radiographer who had been frequently exposed to radiation, we couldn't rule out the possibility of malignancy.

In general, patients with gliosarcoma that mimics meningioma clinically have longer survival. Those who have tumour-resembling meningioma grossly usually have 16 months of median survival as compared to only 9.6 months in those resembling glioblastoma[4]. In other case series, Salvati et al.[5] highlighted the presence of 2 histological subtypes of gliosarcoma that are gliosarcoma with a prevalence of sarcomatous component and gliosarcoma with a prevalence of gliomatous component. The former has similar surgical and radiological features with meningioma with longer median survival time while the latter is similar to glioblastomas surgically and radiologically[5]. In term of tumour recurrent, patient with predominant sarcomatous component recurred later (mean of 59.7 weeks) as compared to gliomatous predominance with a mean recurrent period of 47 weeks)[5]. It is correlated well with this case as the patient still free from tumour recurrent.

Despite the longer survival time for gliosarcoma mimicking meningioma, primary gliosarcoma, in general, is clinically challenging due to poor prognosis, rarity and limited experience in managing this rare variant[6]. Besides, managing gliosarcoma can be even more challenging if it is extracranial. Gliosarcoma can be extracranial and multifocal with a reported case of the multifocal spinal cord and meningeal involvement of this type of tumour[7]. Therefore, this case is to highlight the presence of this rare variant of a brain tumour and its challenges.

CONCLUSION

In conclusion, individuals with high-risk radiation exposure particularly radiographer as in our case require special attention when it comes to the diagnosis of malignancy. Despite indolent clinical presentations mimicking benign nature of the disease, thorough evaluation has to be made to avoid misdiagnosis and subsequently leading to mismanagement of the patient.

CONFLICT OF INTEREST

The authors declare that they have no competing interests in publishing this case.

CONSENTS

Written informed consent was obtained from the patient to publish the case. A copy of the written consent is available for review by the Chief Editor.

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