Case 15514

Eurorad

Gliosarcoma: a rare brain tumour in a middle-aged man

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Section: Neuroradiology
Area of Interest: Neuroradiology brain
Procedure: Diagnostic procedure
Procedure: Laboratory tests
Imaging Technique: CT
Imaging Technique: MR
Imaging Technique: Experimental
Special Focus: Neoplasia Case Type: Clinical Cases
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Patient: 55 years, male

Clinical History:

A 55-year-old man presented to our department with persistent headache, behavioural, expressive and walking disorders. He initially underwent a computed tomography scan (CT) and subsequently a brain magnetic resonance (MR) examination.

Imaging Findings:

The CT examination without administration of contrast medium revealed a large heterogeneous hypoattenuating occupying lesion in the right frontoparietal region and peritumoral oedema. The brain MRI confirmed the presence of a mass and contributed to further evaluation of the tumour. The lesion was heterogeneous, moderately hypointense on TI-weighted images and displayed an intense ring-enhancement and regional intratumoral nodular and strip enhancement on gadolinium enhanced images. T2-weighted and FLAIR images demonstrated hyper- and iso to hypointense areas within the tumour and remarkable surrounding oedema. The appearance of the lesion was quite typical of glioblastoma. The patient underwent tumour resection. The histologic examination revealed gliosarcoma. A series of chemotherapy and adjuvant radiotherapy were applied after surgery. However, the brain tumour recurred 9 months later and the patient expired.

Discussion:

Gliosarcoma is a rare brain tumour with glial and sarcomatous components [1]. The glial component is identical to that of a typical glioblastoma (GB), while most sarcomatous components appear as fibrosarcoma and malignant fibrous histiocytoma. Gliosarcomas have an incidence of 1.8-2.8 % that of GBs and affect adults in the fourth to sixth decade of life, with a male predominance (M:F ratio 1.4-1.8:1) [2]. Clinical presentation includes aphasia, headache, hemiparesis, seizures and cognitive decline, depending on the location of the tumour [3].

Gliosarcomas share common characteristics with GBs, but there are some distinguishing features. Gliosarcoma is almost always found supratentorially, with a temporal lobe predilection [1, 2], although it can also affect the frontal, parietal and occipital lobes [4]. Gliosarcomas are intraaxial lesions with solid and cystic components, which are peripheral to and invasive of the dura or the falx [5]. They can be broadly near the dura or have a dural tail and

sometimes they mimic meningiomas [6]. They appear as sharply defined lesions with predominantly low attenuation or inhomogeneous isoattenuation on CT scans and mild to moderate peritumoral oedema, possibly due to the slower growth pattern of gliosarcoma [7]. The tumours display intense peripheral or irregular ring enhancement on contrast-enhanced CT images. They are generally hypointense to white matter on T1-weighted images and hyperintense on FLAIR and T2-weighted images. After the administration of gadolinium, the tumours are homogeneous or heterogeneous, especially when they are large. Gliosarcomas demonstrate an uneven and thick-walled, rim or ring-like enhancement, a phenomenon likely caused by peripheral displacement of vessels as the tumour enlarges [6]. Han et al described intratumoral strip enhancement on enhanced T1-weighted images, which may be related to tumoral angiogenesis [6]. Gliosarcomas are found to be much less hypointense on T2-weighted images than other glial neoplasms, probably due to the dense cellularity and fibrous nature of the non-glial tissue [5]. Notably, the less intense portions on T2-weighted images coincide with the strongly enhancing areas on contrast-enhanced T1-weighted images [6], and may represent the relatively solid sarcomatous component. On the contrary, areas of hyperintensity on T2-weighted images correspond to the glial component with associated necrotic or cystic changes. Extracranial metastases are more common than with GBs, in 15-30% of patients [8]. Dissemination occurs via blood to lungs, bone, liver, spleen and lymphatic ganglion tissues [1, 9].

Treatment modalities for gliosarcoma include tumour resection, postoperative radiation therapy and chemotherapy [2]. The median overall survival is 10 months [7, 10]. MGMT methylation and IDH1 mutation are rare in gliosarcomas and therefore irrelevant for the prognosis [11].
Differential Diagnosis List: Gliosarcoma, Glioblastoma multiforme, Meningioma, Primitive neuroectodermal tumour (PNET), Astroblastoma, Gliofibroma, Brain abscess, Metastasis

Final Diagnosis: Gliosarcoma

References:

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Lutterbach J, Guttenberger R, Pagenstecher A (2001) Gliosarcoma:a clinical study. Radiother Oncol 61:57-64 (PMID: 11578729)
Perry J, Ang LC, Bilbao JM et al (1995) Clinicopathologic features of primary and postirradiation cerebral gliosarcoma. Cancer 75:2910-2918 (PMID: 7773942)
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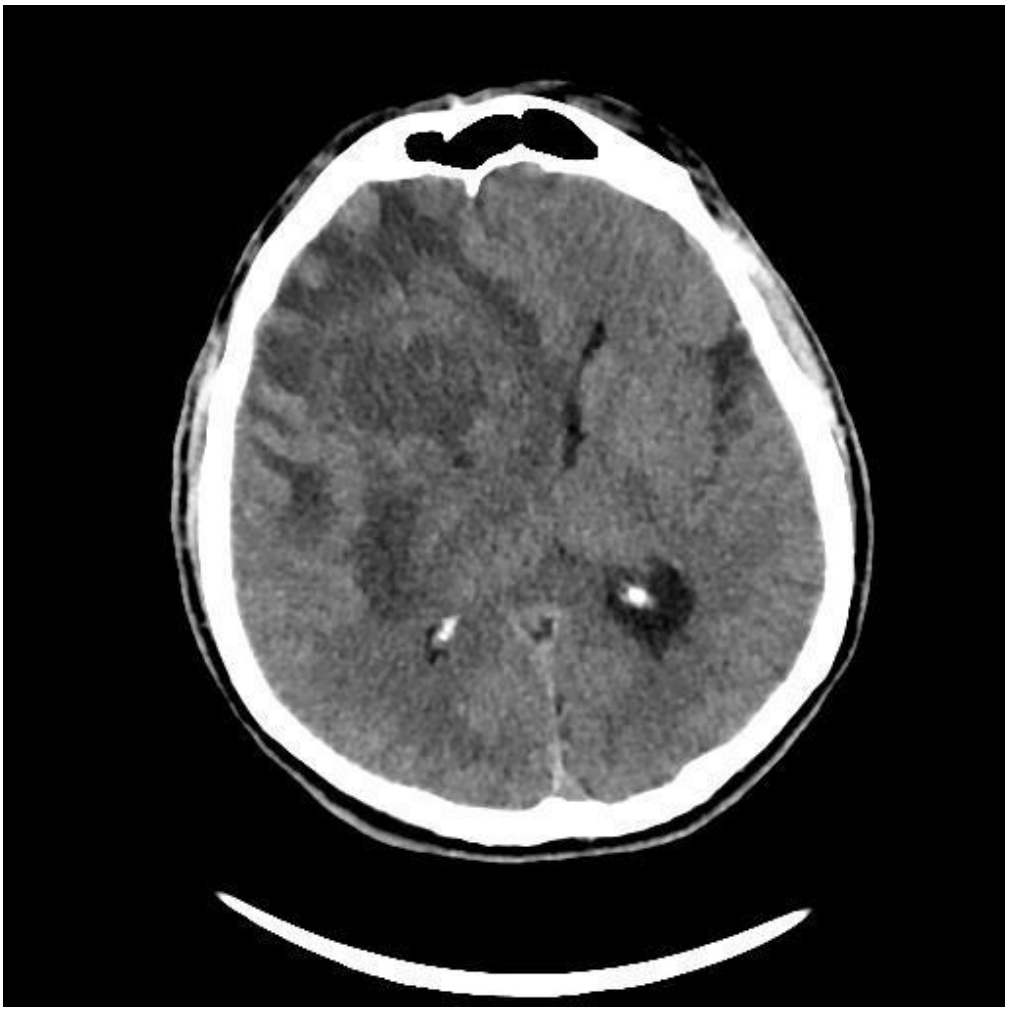
Lee D., Kang SY, Suh YL et al (2012) Clinicopathologic and genomic features of gliosarcomas. J. Neurooncol 2012May;107(3):643-50 (PMID: 22270848)

Figure 1

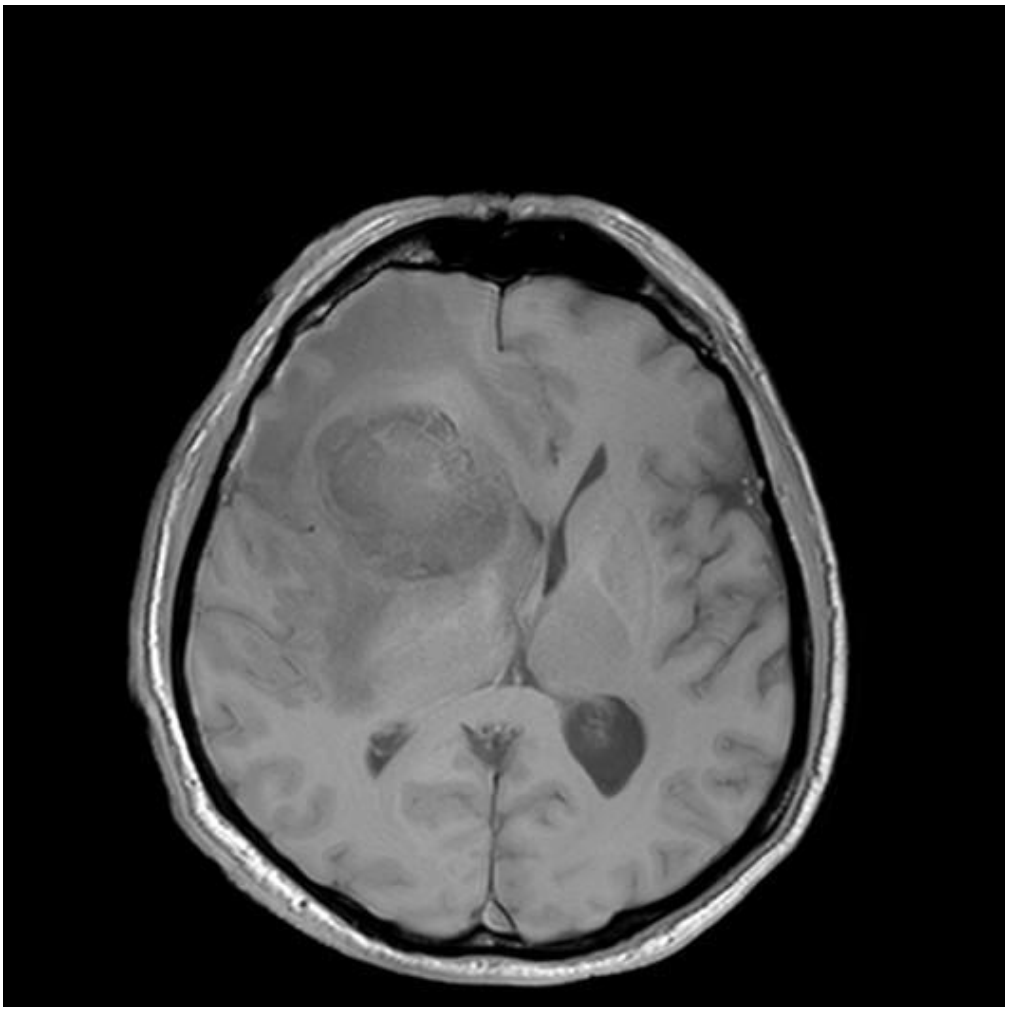
a



Description: Axial CT image showing a large heterogeneous mass in the right frontoparietal region with hypodense centre and surrounding oedema. **Origin:** Department of Radiology, Papageorgiou General Hospital. Thessaloniki, Greece

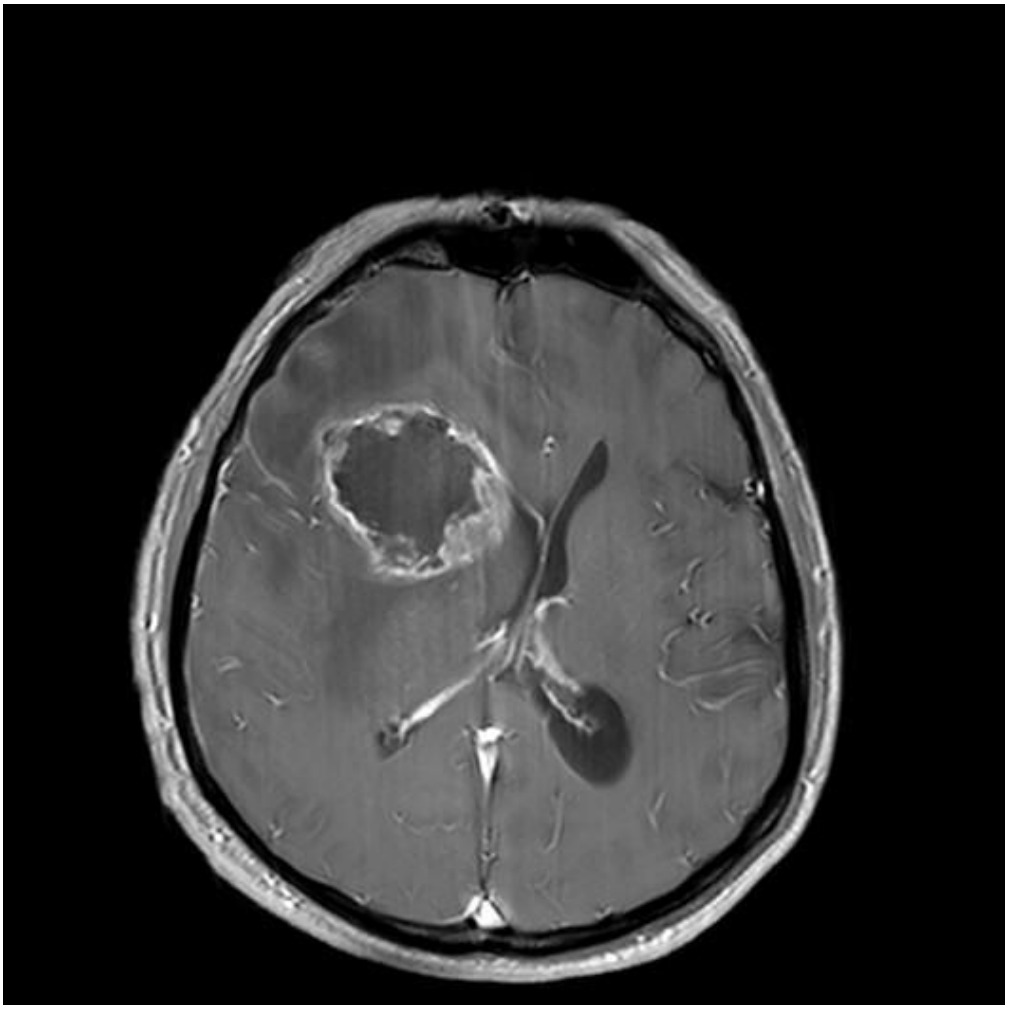
Figure 2

a



Description: Axial T1-weighted image shows an iso to hypointense lesion in the right frontoparietal region. **Origin:** Department of Radiology, Papageorgiou General Hospital, Thessaloniki, Greece

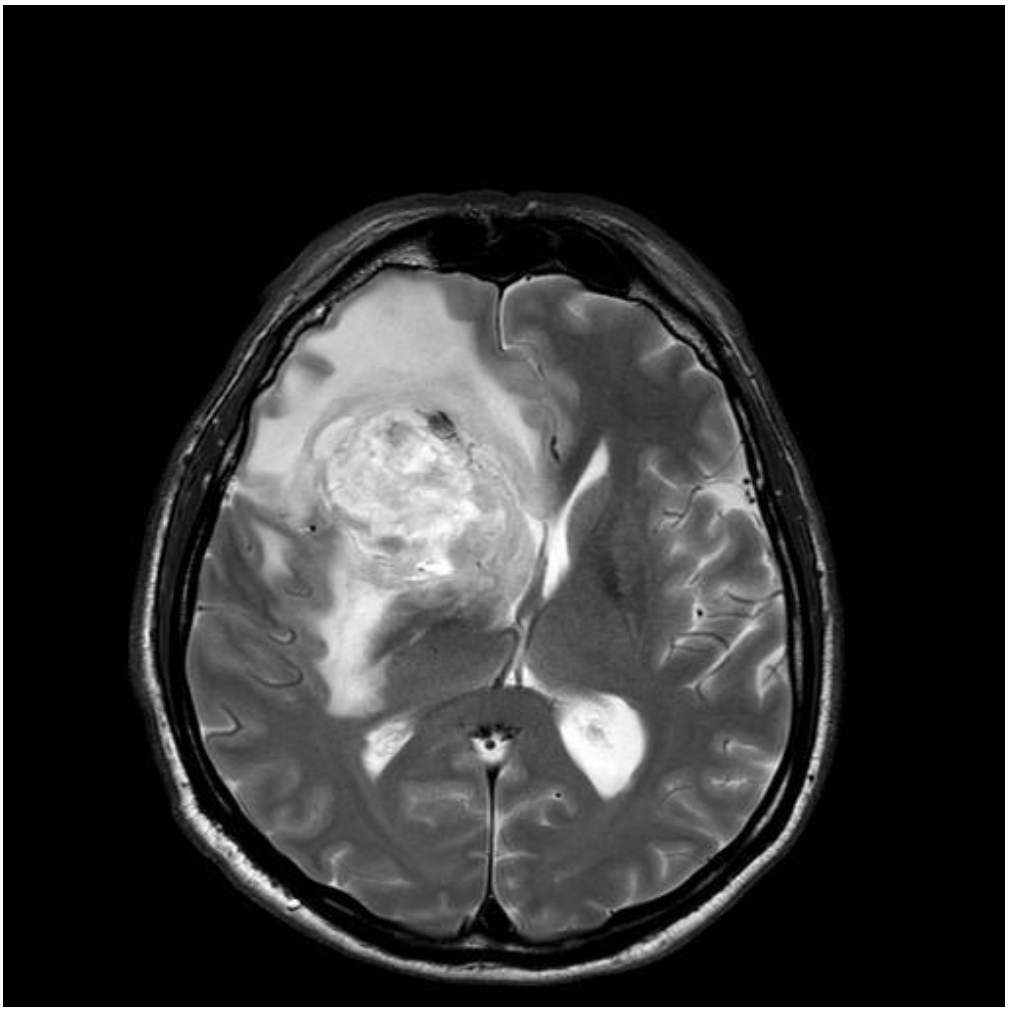
b



Description: Enhanced axial T1-weighted image demonstrates thick-walled ring enhancement. **Origin:** Department of Radiology, Papageorgiou General Hospital, Thessaloniki, Greece

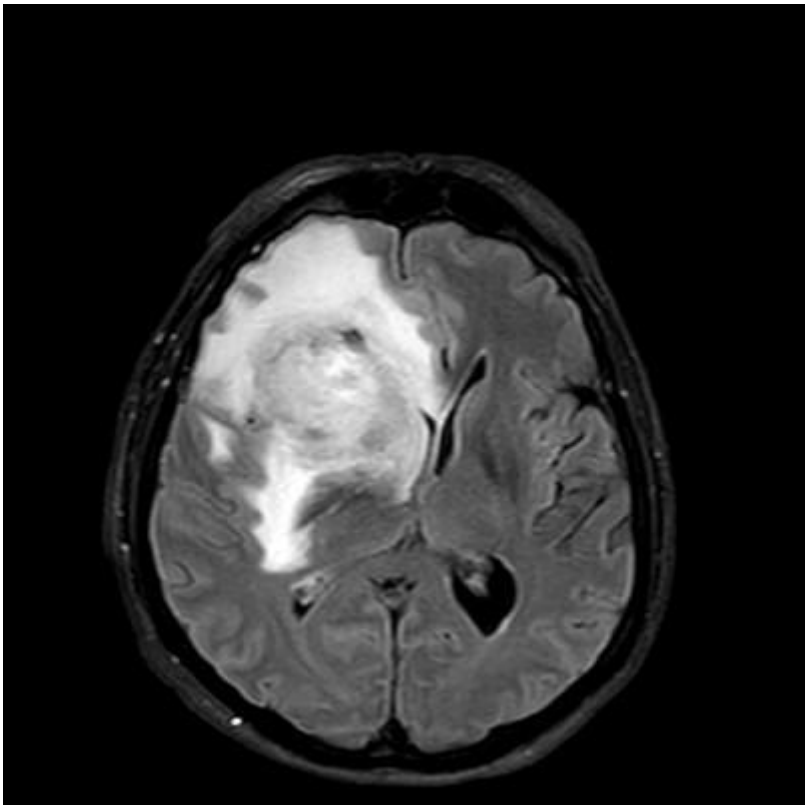
Figure 3

a



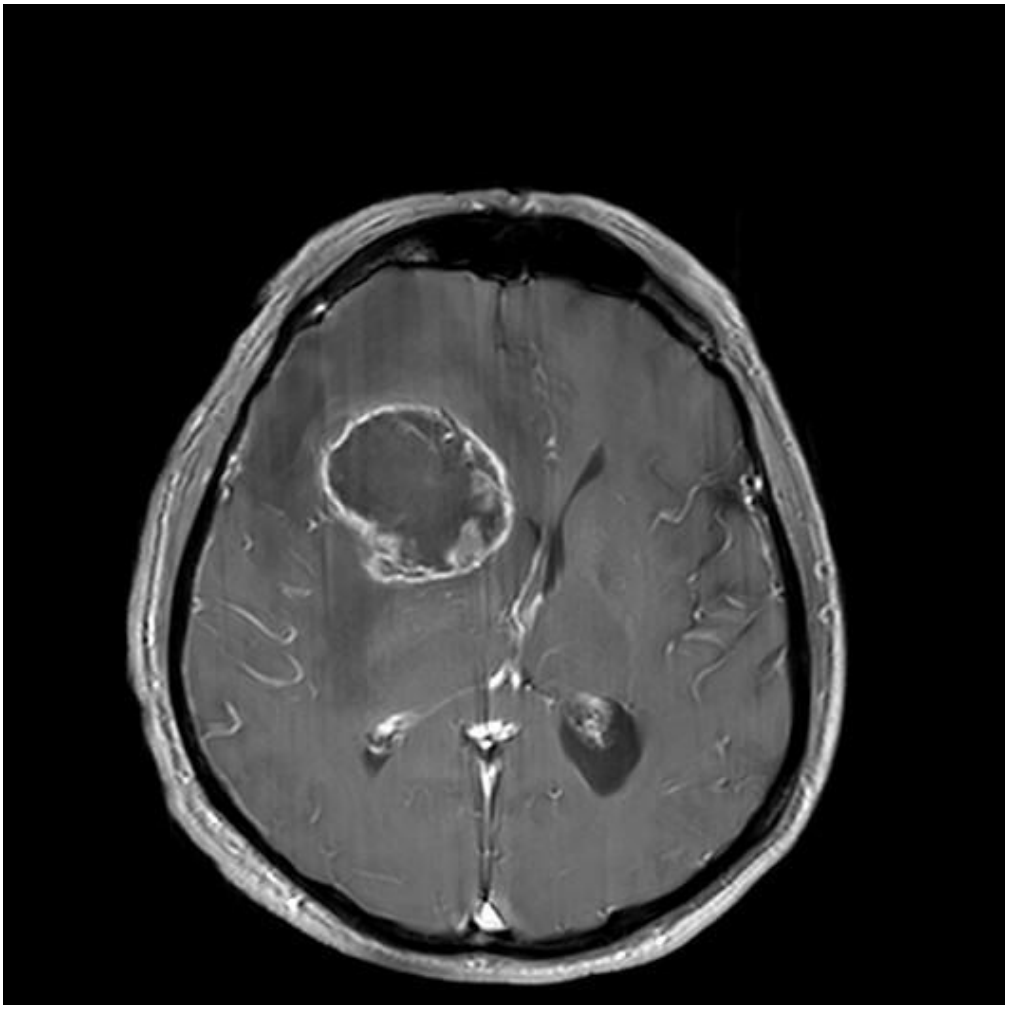
Description: Axial T2-weighted image shows a heterogeneous lesion with hyper and hypointense nodular elements. The latter possibly correspond to the sarcomatous component. **Origin:** Department of Radiology, Papageorgiou General Hospital, Thessaloniki, Greece.

b



Description: Axial T2-FLAIR image shows the heterogeneous lesion and extensive perilesional oedema. **Origin:** Department of Radiology, Papageorgiou General Hospital, Thessaloniki, Greece.

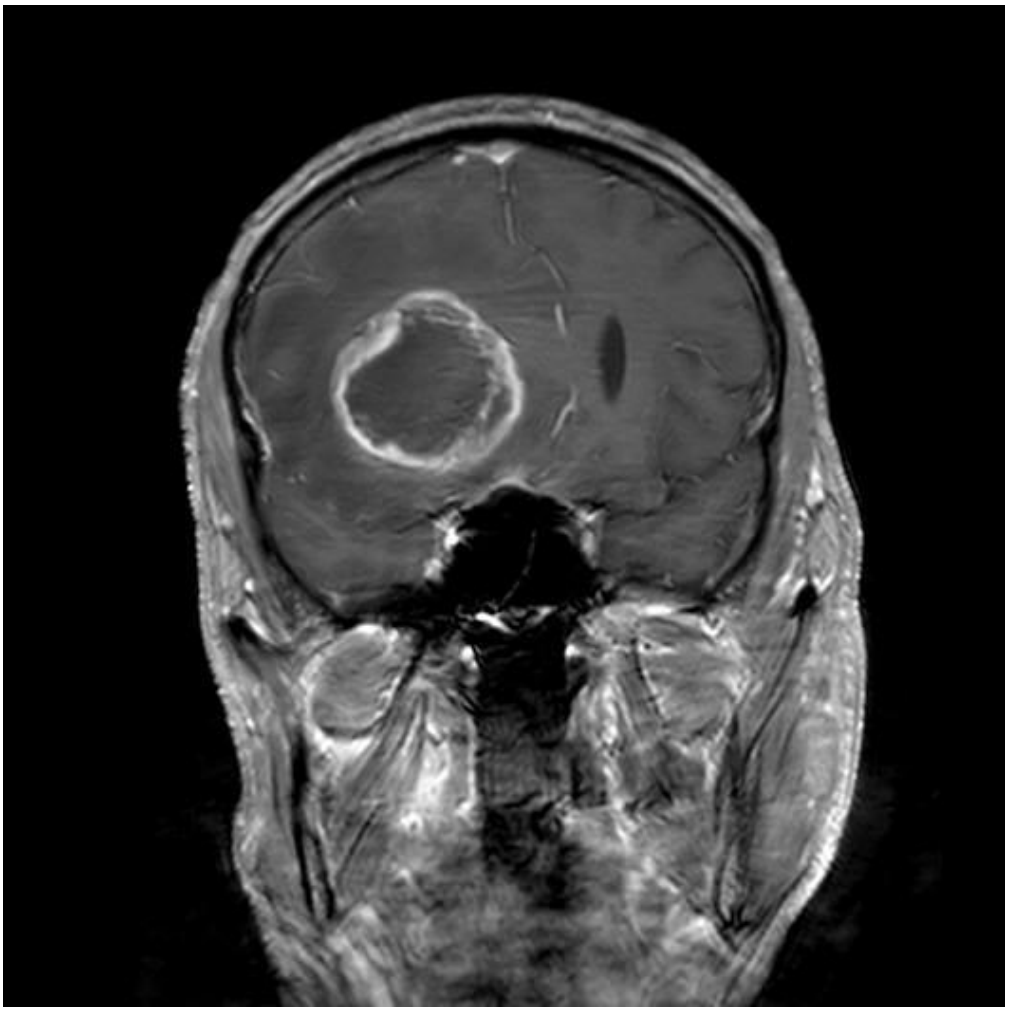
c



Description: Axial enhanced T1-weighted image shows nodular enhancement of the solid sarcomatous components. **Origin:** Department of Radiology, Papageorgiou General Hospital, Thessaloniki, Greece.

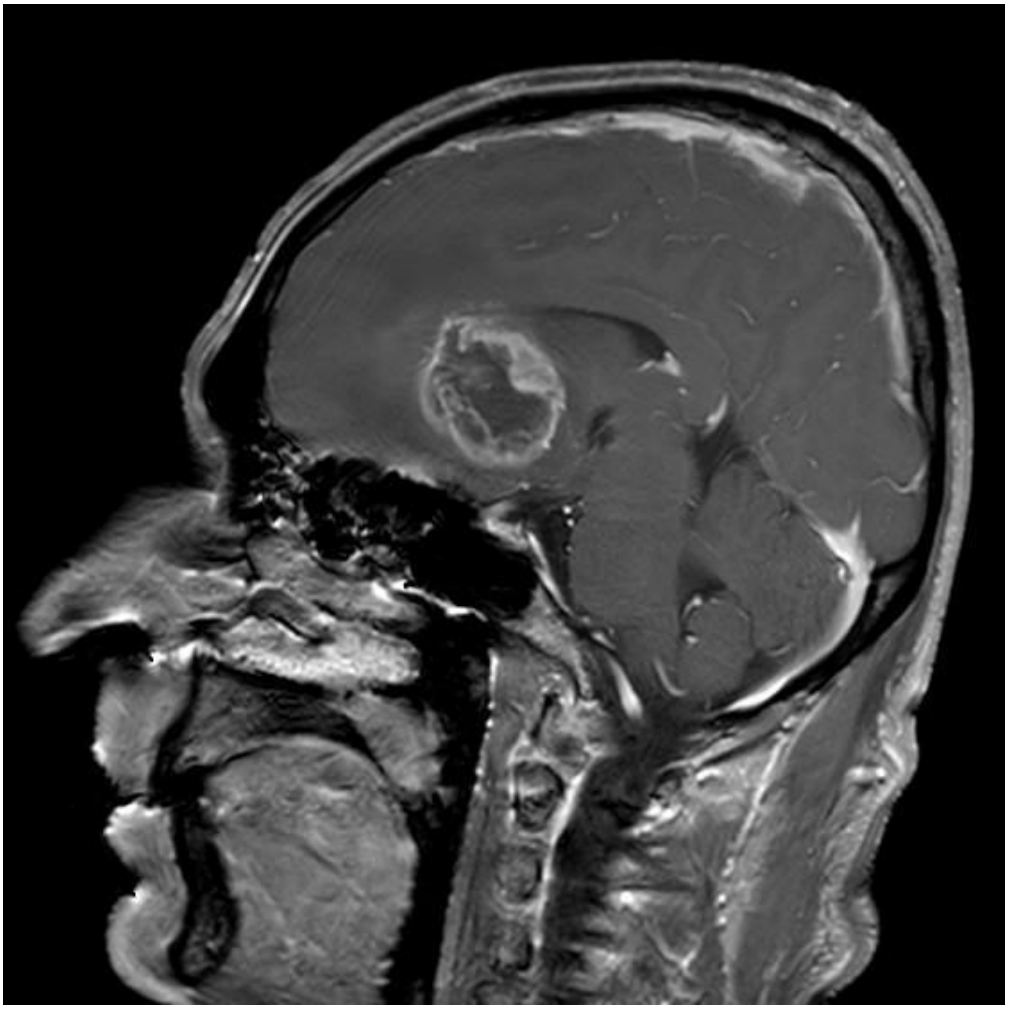
Figure 4

a



Description: Coronal enhanced T1-weighted image shows regional strip enhancement within the tumour. **Origin:** Department of Radiology, Papageorgiou General Hospital, Thessaloniki, Greece.

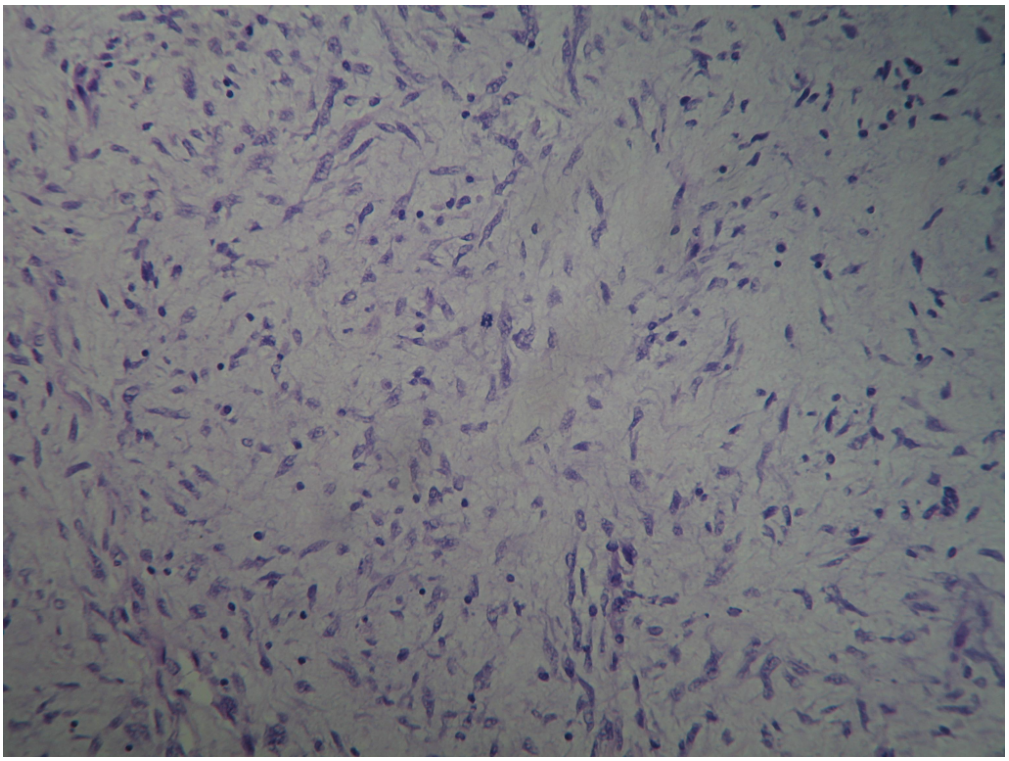
b



Description: Sagittal enhanced T1- weighted image shows intratumoral strip enhancement. **Origin:** Department of Radiology, Papageorgiou General Hospital, Thessaloniki, Greece.

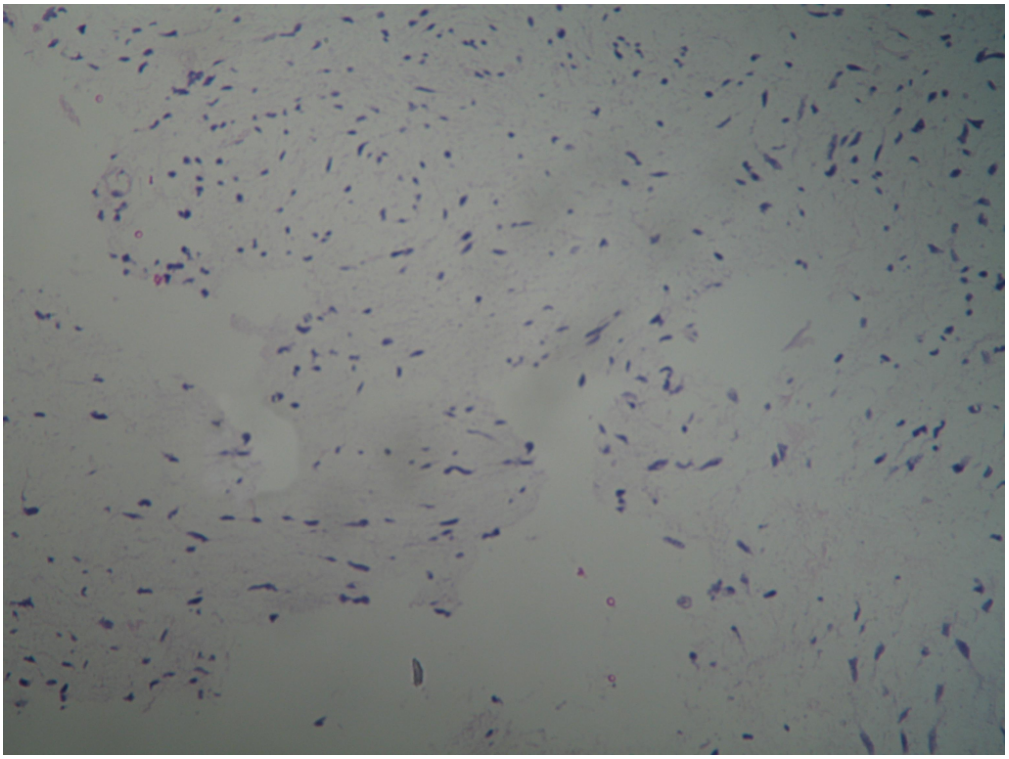
Figure 5

a



Description: Portion of the tumour showing sarcomatous spindle morphology. **Origin:** Department of Radiology, Papageorgiou General Hospital, Greece, Thessaloniki

b



Description: Portion of the tumour showing glial components. **Origin:** Department of Radiology, Papageorgiou General Hospital, Greece, Thessaloniki