**Meningioma and Glioma Co-occurring in a Single Patient: A Rare Case Report**

**Abstract**

Introduction and importance

Meningioma and glioma are common primary brain tumors with different pathophysiologies. The co-occurrence of these two lesions in the same patient without any history of radiotherapy, phacomatosis, or genetic abnormalities is extremely rare and poorly understood.

Case presentation

We report a case of a 71-year-old male who presented with weakness of left upper and lower limbs. He had no history of trauma, headache, or any comorbidities. CT scan and MRI of brain revealed a right frontal meningioma and a right parietal high-grade glioma. He underwent right temporoparietal craniotomy and excision of both tumors. Histopathological examination confirmed the diagnosis of fibrous meningioma (WHO grade 1) and high-grade glial tumor (WHO grade 4). He recovered completely and was discharged in stable condition.

Clinical discussion

This case demonstrates the rare phenomenon of simultaneous occurrence of meningioma and glioma in the same patient without any known predisposing factors. The exact mechanism behind this phenomenon is unclear, but various hypotheses have been proposed, such as chance, genetic factors, chemical exposure, injury, or immune system mechanism. The diagnosis of multiple primary brain tumors requires careful radiological and histopathological evaluation.

Conclusion

Clinicians should be aware of the possibility of co-existence of multiple primary brain tumors with different histologies in the same patient without any history of radiotherapy, phacomatosis, or genetic abnormalities. Surgical intervention is the main therapeutic option for such cases.

**Introduction**

Primary brain tumors are less frequent intracranial neoplasms as compared to metastatic brain tumors (1). Meningioma and glioma are common primary brain tumors accounting for 30% and 33% of all brain tumors respectively (2). The pathophysiologies of meningioma and glioma are disparate. The concurrence of these two lesions in same patient is extremely rare, only few such cases are documented till now (3). The coexistence of multiple primary brain tumors is a rare phenomenon that can be attributed to a complex process of tumorigenesis involving irradiation and potentially the association of residual embryonic tissue undergoing neoplastic transformation (4). Meningioma and gliotic tumors can occur at the same time or even collide. This is mainly seen in some phacomatosis like von Recklinghausen neurofibromatosis, and in other genetic syndromes such as Turcot’s and Sipple’s syndrome. It can also happen after cranial radiotherapy (5).

Here we present a case of a patient who had both meningioma and glioma at the same time, without any prior exposure to radiotherapy or any genetic abnormalities.

**Case presentation**

A 71year male presented with chief complaint of weakness of left upper limbs and lower limbs for 22 days. He developed sudden weakness of left hand associated with numbness. He was unable to hold weight in his left hand and was unaware of things slipping off his hand. Then, he developed weakness of his left foot and was unaware of slipping off his slipper. There was no history of abnormal body movement, altered behavior and memory. He didn’t give history of trauma, headache, photophobia, slurring of speech, difficulty in swallowing. He did not give history of any prior comorbidities- diabetes mellitus, hypertension.

On admission, his general condition was fair (GCS- E4V2M5). Bilateral pupils were 2mm in diameter, and reactive to light. He was alert, conscious and well oriented to time, place, person. His vital signs were stable and within normal limits. There was no pallor, icterus, lymphadenopathy, edema, dehydration, cyanosis or clubbing. There was weakness in his left upper and lower limbs (muscle power was 5/5 and 5/5 respectively). There was no weakness in his right upper and lower limb with muscle power 5/5. Bulk and tone of his upper and lower limbs were normal. There was decreased sensation in his left hand and below left knee. However, sensations of right upper and lower limbs were intact. Bilateral plantar reflex was down going. His higher mental function and cranial nerves were normal. There was no facial deviation. Cerebellar sign, meningeal irritation, clonus were absent. His heart sounds S1 and S2 were normal with no murmur. His breathing sounds were normal with no added sounds. The rest of the systemic examination findings were regular.

Investigations such as hematological tests, Liver function tests (LFTs), Renal Function Tests (RFTs), Computed Tomography (CT) scan of head, Magnetic Resonance Imaging (MRI) of brain with Magnetic resonance Spectroscopy (MRS) were done as shown in table 1. CT scan of head showed approximately 1.4x1.2 cm sized hyperdense extra-axial mass in right frontal cortex. A well-defined round solid cystic lesion of 4x3cm is noted in the white matter of right parietal lobe. Areas of calcification and hemorrhage were absent. Perilesional edema was seen. Mass effect was noted in the form of effacement of adjacent sulci and compression of body of right lateral ventricle. CT scan findings was suggestive of right frontal meningioma and right parietal malignant neoplastic lesion as shown in figure 3. MRI scan of brain with MRS revealed solid cystic mass in front-parietal region with patchy diffusion restriction, tiny foci of blooming and patchy intense enhancement of solid component with perilesional edema and mild surrounding mass effect with effacement of adjacent sulci- features suggestive of high-grade glioma as in figure 1 and 2. T1/T2 low and FLAIR high intense and homogenously enhancing lesion in right frontal parasagittal region- likely of meningioma, as shown in figure 1 and 2.

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| --- | --- | --- | --- |
| Tests | Units | Results | Reference range |
| Sodium | mEq/L | 137 | 135-146 |
| Potassium | mEq/L | 3.4 | 3.5-5.2 |
| Urea | mmol/L | 6.8 | 2.8-7.2 |
| Creatinine | mmol/L | 77 | 59-104 |
| Glucose random | mmol/L | 5.3 | 3.8-7.8 |
| Total bilirubin | Umol/L | 20 | 5-21 |
| Direct bilirubin | Umol/L | 3 | <4 |
| SGPT/ALT | U/L | 22 | 0-50 |
| SGOT/AST | U/L | 33 | 0-50 |
| Alkaline Phosphatase | U/L | 72 | 30-120 |
| Total protein | gm/l | 65 | 66-83 |
| Albumin | gm/l | 43 | 35-52 |
| LDH | U/L | 195 | 0-248 |
| TLC | /cmm | 7100 | 4000-11000 |
| Hb | gm% | 16.4 | 12-18 |
| RBC | Million/cu | 5.32 | 4.5-5.5 |
| Platelets | /cumm | 2,80,000 | 150000-4000000 |

Table 1: SGPT- Serum glutamate pyruvate transaminase (SGPT), ALT- Alanine transaminase

SGOT- Serum glutamic-oxaloacetic transaminase, AST- Aspartate transaminase, LDH- Lactate dehydrogenase, TLC- Total leukocyte count, Hb- Hemoglobin, RBC- Red Blood Cells

The patient underwent right temporoparietal craniotomy. Meningioma and high-grade glioma was excised and sent for biopsy. Histopathological report confirmed it was high grade glial tumor (WHO grade 4) and fibrous meningioma (WHO grade 1) as shown in figure 4 and 5. The diagnosis of meningioma along with high-grade glioma was made.

The patient was discharged at stable state and was completely well during follow up.





Figure 1: MRI brain saggital section showing Meningioma (black arrow) and Glioma (white arrow)

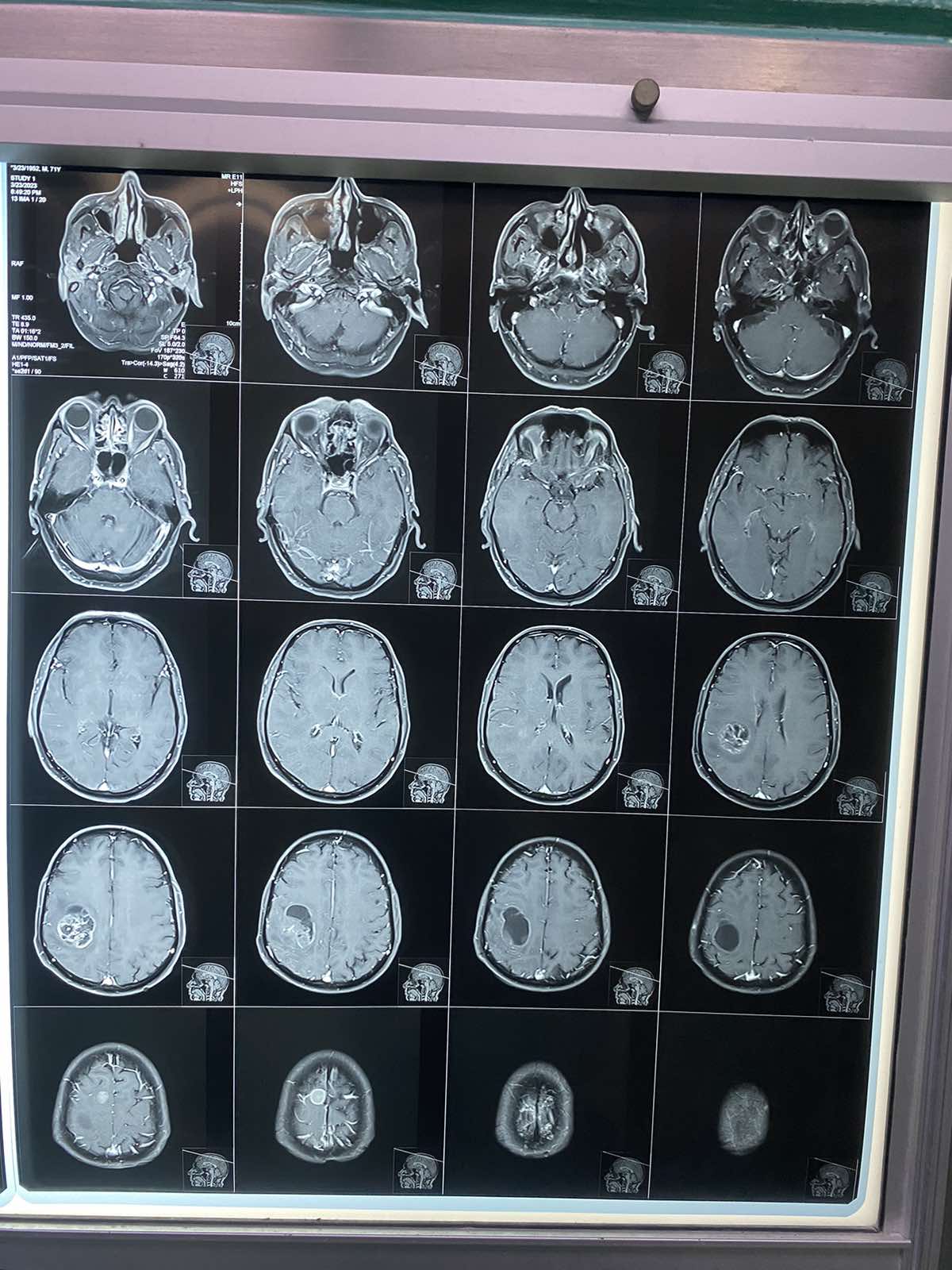




Figure 2: MRI brain with axial section showing Meningioma (white arrow) and Glioma (green arrow)





Figure 3: CT scan of brain showing Meningioma (purple arrow) and Glioma (green arrow)

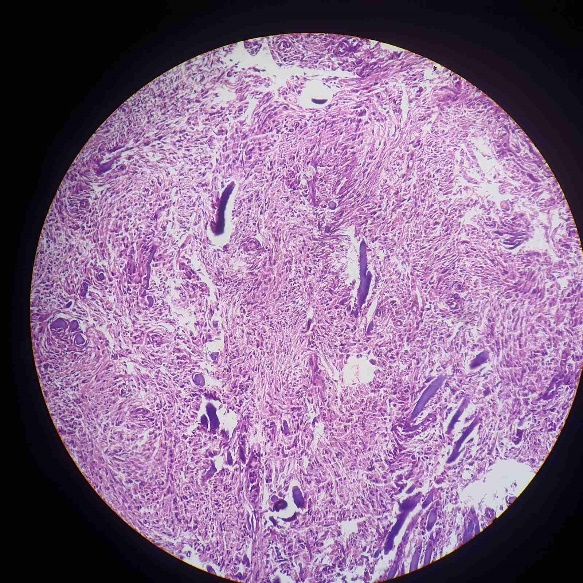
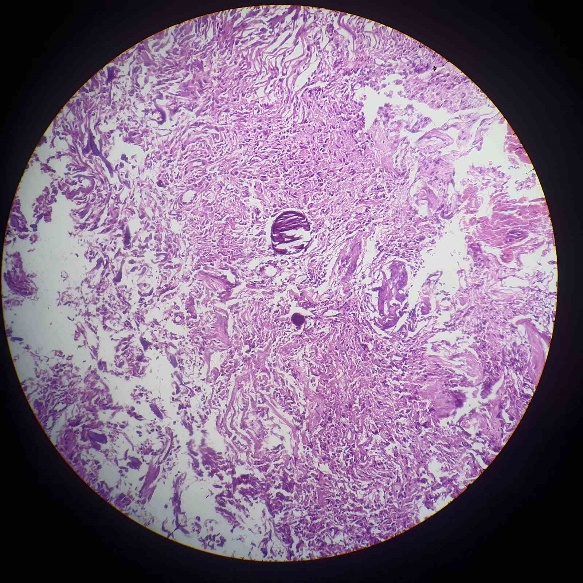
 

Figure 4: Low power view showing spindle Figure 5: Psammoma bodies at the centre of

shaped cells suggestive of Meningioma field suggestive of meningioma

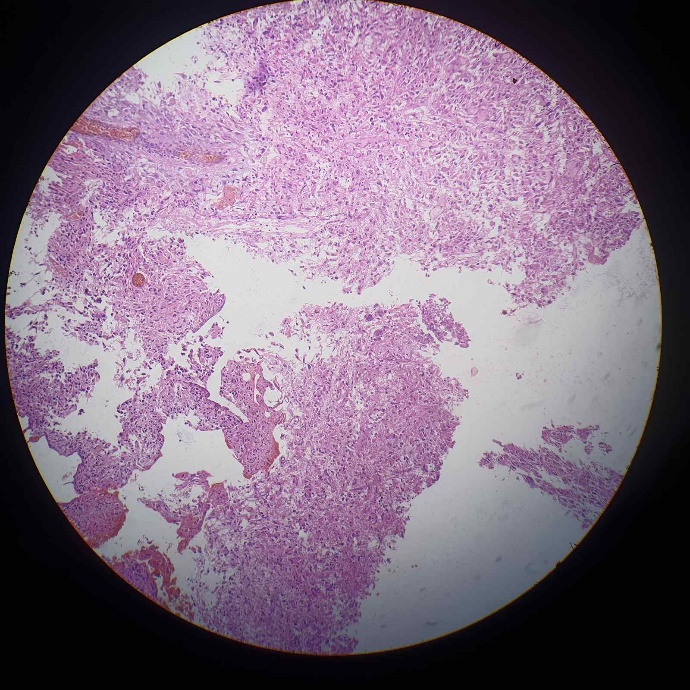


Figure 6: High grade glial tumor showing pleomorphism. Tumor cells are arranged in sheets. 100 X magnification H n E stain

**Discussion**

The simultaneous occurrence of meningioma and glioma in the same patient with no history of radiotherapy, phacomatosis or any genetic abnormalities is very rare. The literature has reported about 67 cases of concurrent meningioma and glioma since the first case was described in 1938. The exact underlying mechanism behind this is still in controversies (6). A patient with multiple primary brain tumors with different histology at the same time is a very rare condition. This condition can be related to radiotherapy or phacomatosis, but it can also occur without any reason (7). In this case report, we present a case of a patient with concurrent meningioma and glioma, who had no history of radiotherapy, phacomatosis or any genetic disorders.

This rare condition has been explained by various potential hypotheses (8). The coexistence of meningioma and glioma is more likely due to chance than to a shared mechanism that causes both types of tumors (9). This phenomenon may be caused by some genetic factors, chemical exposure, injury, or immune system mechanism. Some believe that locally acting oncogenic paracrine factor from meningioma may affect the nearby brain tissue and glial cells and make them malignant (10). Low-grade glioma may cause proliferative changes in the meninges. However, the exact pathophysiology of this phenomenon remains unclear (8).

The occurrence of multiple, primary brain tumors is a remarkable phenomenon. Surgical intervention is the main therapeutic option (11). For confirmation of this rare occurrence of double primary brain tumors of different histological types, biopsy should be performed. Here, histopathological report confirmed the presence of high grade glial tumor and meningioma shown by MRI and CT scan of head.

**Conclusion**

Surgeons should be aware of the rare phenomenon of simultaneous presence of multiple primary brain tumors in same patient without any history of exposure to radiotherapy, phacomatosis or any genetic abnormalities. Multiple primary brain tumors can further be confirmed by biopsy.

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