

Received: 2017.04.27
Accepted: 2017.07.24
Published: 2017.11.04

ISSN 1941-5923
© Am J Case Rep, 2017; 18: 1166-1170
DOI: 10.12659/AJCR.905067

Anaplastic Meningioma Presenting as a Left Parietal Mass: A Case Report

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Manuscript Preparation E
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Conflict of interest: None declared

Patient: Female, 67
Final Diagnosis: Meningioma
Symptoms: Headache
Medication: —
Clinical Procedure: —
Specialty: Oncology





Objective: Unusual clinical course
Background: Meningiomas are slow-growing tumors attached to the dura mater and are composed of neoplastic meningotheelial cells. The tumors are most commonly located in convexities, and it is relatively rare to find such a growth in the parietal region such as the one presented in this case report.

Case Report: Because of its uncommon presentation, we hereby report the case of a 67-year-old, previously healthy, white Lebanese female patient who presented with forgetfulness, unsteady gait, right-sided motor weakness, and dysphagia. She was found to have an anaplastic meningioma located in the left parietal lobe that was treated by surgical resection. The patient had an uneventful postoperative course, and was stable at later follow-ups.

Conclusions: This case report describes the clinical presentation, pathological findings, and the prognosis of this mass, which is atypical in this location, and has been rarely reported in the literature. We also review the literature on anaplastic meningiomas.

MeSH Keywords: Meningioma • Oligodendroglioma • Parietal Lobe

Full-text PDF: <https://www.amjcaserep.com/abstract/index/idArt/905067>

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Background

This case report is the first of its kind in the Middle East region, as no previous studies have reported cases of anaplastic meningiomas in the region before. The location, histology, and overall presentation of the case is significant due to its rarity, and the geographical location of the case in Lebanon, a country in the Middle East, further increases the uniqueness of the case.

Meningiomas constitute 15% of intracranial primary tumors, and according to studies, they are the most common extra-axial tumors [1]. Moreover, their incidence tends to increase with age and occurring more in females than males (with a 2: 1 ratio) [2].

The majority of meningiomas are spontaneous and of unknown etiology. However, there are some risk factors that might increase predisposition to acquiring the tumor, such as exposure to radiation and genetic disorders such as neurofibromatosis 2 (NF 2) [3]. Patients with NF 2 may have multiple meningiomas and an increased incidence of other central nervous system tumors, including schwannomas and ependymomas.

Many meningioma patients present with muscle weakness; however, this is not a specific symptom that can be attributed to meningiomas [4]. No differences were seen in the presenting signs and symptoms of atypical and malignant meningiomas. Some of the clinical presentations might include motor/sensory deficits, headache, visual disturbance, hearing loss, memory loss (cognitive dysfunction), seizure, urinary incontinence, nausea, vomiting, confusion, dysphasia, and syncope. Limb weakness and headache were found to be the most common complaints, while limb paresis was the most common sign. Moreover, these presenting signs and symptoms depend on the location of the mass, the tissues it impinges on, and the vessels it obstructs [1,4].

MRI is the screening modality of choice in the study or detection of meningiomas. However, it cannot distinguish between benign and malignant meningiomas [3]. A biopsy is the only method that can help in specifying the type of meningioma under study. The use of imaging techniques as well as being capable of differentiating the symptoms well is of immense importance for the proper diagnosis of meningiomas [4]. WHO grade II (atypical) and grade III (anaplastic) meningiomas account for 5–7% and 1–3% of cases, respectively. The majority (92%) of meningiomas are benign (grade I) [3].

This case presents one of the first anaplastic meningiomas of its kind in the region. Anaplastic meningiomas, just like other types of meningiomas, are most commonly found in cerebrum and cerebellar convexities, followed by localization at the sphenoid wing, tentorium, and sagittal sinus. However, in this case, the anaplastic meningioma presented as a left parietal mass.

Case Report

A 67-year-old, previously healthy, white Lebanese female presented with complaint of forgetfulness of 3 months' duration. She also complained of an unsteady gait, right-sided upper and lower motor weakness, fatigue, and dysphasia that started 2 weeks prior to presentation. She also presented with a left parietal head/skull round mass of 5–6-month duration that was previously neglected but had greatly increased in size. On admission, the patient was alert and well-oriented. Physical exam was unremarkable except for a scalp mass and right-sided weakness (motor power 4+/5 all over). Moreover, the neurological exam results (equally reactive pupils, CN III–CN XII) were normal. Furthermore, she had intact sensation. The patient complained of occasional headache. However, no seizures or nausea and vomiting were reported, and there was no drop in level of consciousness. MRI of the brain demonstrated a 10×7.2 cm large solid mass centered in the left parietal bone and having epidural and subcutaneous components (Figures 1–3). In addition, CT of the chest, abdomen, and pelvis revealed no abnormalities. Routine laboratory test results were within normal values. The patient was started on levetiracetam and prednisone and the weakness improved. The patient was subjected to left parietal craniotomy for resection of the tumor.

Written informed consent was obtained from the patient concerning the craniotomy, and she was admitted to the hospital for surgical resection of the tumor. The tumor was completely dissected from the underlying dura, and any residual mass was burned by electrocautery (bipolar method). This surgical resection achieved a Simpson Grade of II, as the tumor was totally resected and its dural attachments were coagulated with cautery. Before the operation, the mass was suspected to either be a metastasis, a sarcoma, or a plasmocytoma. However, on the basis of its morphologic and immunohistochemical features, the tumor was diagnosed as an anaplastic meningioma (Figures 4, 5).

The patient was released from the hospital after an uneventful recovery, and was scheduled for sessions of adjuvant radiotherapy. After the complete resection of the meningioma, the patient's symptoms improved and she currently has a good performance status. The patient did not visit the hospital earlier because the actual development of symptoms took time. Therefore, the tumor grew considerably prior to the onset of symptoms [5].

The surgical specimens were fixed with 10% formaldehyde and embedded in paraffin. Tissue sections were stained with hematoxylin and eosin (HE) and periodic acid-Schiff (PAS).

Foci of brisk mitotic activity with up to 3 mitoses were viewed per high-power field. Moreover, the classic architecture of a meningothelial meningioma with whorls of tumor cells was detected in the low-power view.

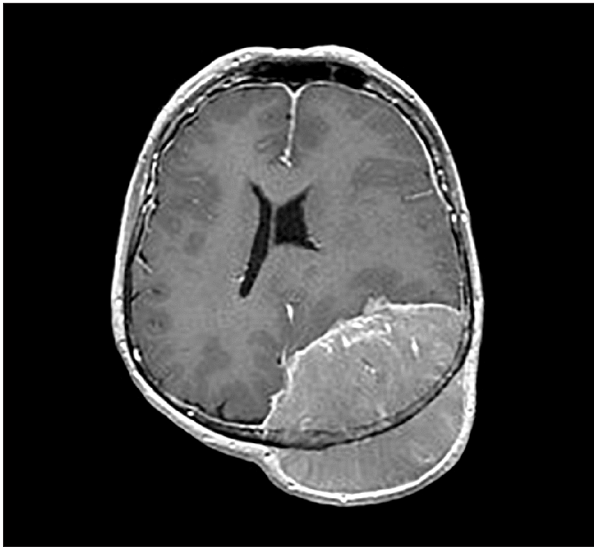


Figure 1. MRI of the brain with gadolinium: Axial T1W sequence showing a large left parietal extra-axial diffusely enhancing mass with edema and mass effect on the brain. There is also a large subcutaneous component of the same mass, although the skull seems intact. 67×67 mm (300×300 DPI).

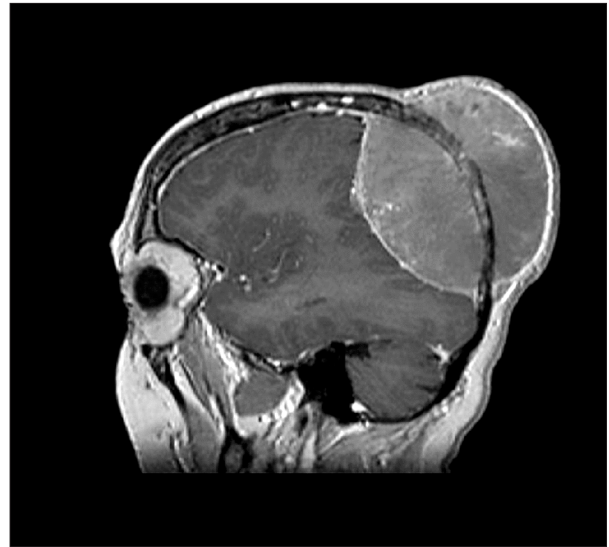


Figure 3. MRI of the brain with gadolinium: Sagittal T1W section showing both extra and intracranial components of the mass. 135×135 mm (300×300 DPI).



Figure 2. MRI of the brain with gadolinium: Coronal T1W enhanced section showing the same findings with the mass in close proximity to the superior sagittal sinus. 135×135 mm (300×300 DPI).

Post-operative imaging was performed, and the MRI showed complete removal of the tumor in the left parietal region (Figure 6). Blood in the epidural space at the region of the operation measured 6.5×13 mm. The patient is being followed up by the medical oncology and radiation oncology physicians to date, and has not had any recurrence of the tumor.

Discussion

Grade III is a class of anaplastic meningiomas that accounts for almost 1–3% of all meningiomas. Anaplastic meningiomas are classified by either the presence of excessive mitotic activity (>20 mitoses per 10 high-power fields), the presence of focal loss of meningotheelial differentiation at the light microscopic level (which in turn results in sarcoma, carcinoma, or melanoma-like appearance), or whenever there is a predominant papillary or rhabdoid morphology [6]. In this particular case, high mitotic activity was present (almost 30 mitoses per 10 high-power fields) and meningotheelial architecture was detected.

The mainstay of treatment of meningiomas is surgical resection. Therefore, the earlier the diagnosis, the better the outcome. The surgical status after resection is an important indicator for the risk of recurrence. Moreover, it has been shown that benign meningiomas have low invasiveness, unlike their malignant counterparts, which have a high risk of recurrence even after complete surgical resection. In some cases, the complete removal of the mass by surgery might be difficult, and this in turn is accompanied with a high recurrence rate. Therefore, it is highly recommended to provide adjuvant treatment after surgery that did not result in the complete removal of the mass [7].

The histological make-up and Ki-67 index of meningiomas can be used as tools to help identify the meningiomas associated with a higher risk of recurrence. This will also guide the treatment decisions and whether adjuvant therapy is needed [2]. Moreover, it has been shown that the rate of p53 overexpression becomes significantly higher as the histological malignancy

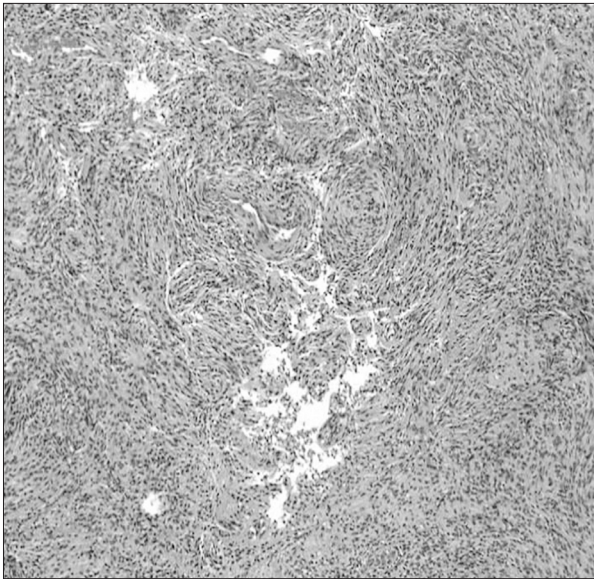


Figure 4. Some tumor cells had an intracellular cytoplasmic inclusion. The typical whorl formations that are highly suggestive of fibrous meningiomas were also observed.

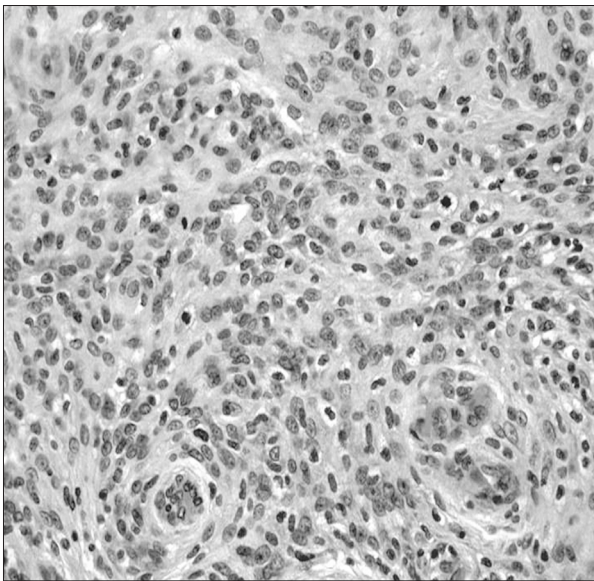


Figure 5. This figure shows many foci of small cells that have a high nuclear/cytoplasmic ratio.

increases, and it is positively correlated with tumor recurrence and malignant progression. Therefore, this correlation can be valuable in determining the grade of meningiomas where there might be some histological controversy [8–14]. Radiographic follow-up of meningiomas with p53 overexpression is therefore recommended.

The main aim of surgery is to completely resect the tumor if possible, and to obtain a sample to determine its pathology and histology [15]. Atypical and anaplastic meningiomas (WHO

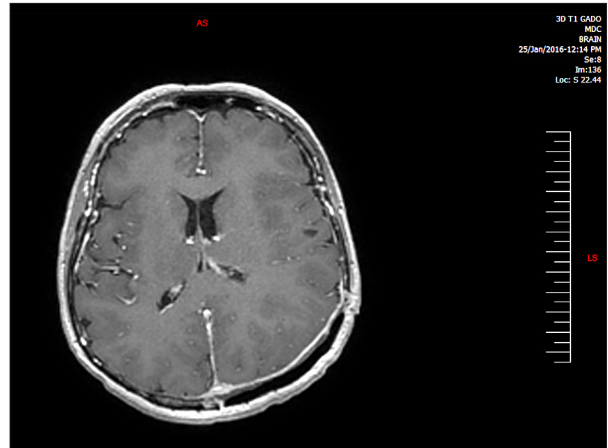


Figure 6. Coronal T1W-enhanced section showing complete removal of the tumor in the left parietal region, with blood in the epidural space at the region of the operation, measuring 6.5×13 mm.

grades II and III, respectively) have been shown to exhibit high rates of recurrence, which can be explained by their ability to invade the parenchyma or aggressiveness of the cells remaining after resection [15]. It has been shown in the case of anaplastic meningiomas, that complete resection will result in increased survival and reduced recurrence rates [2]. Yang et al. (2007) showed that “the extent of resection, adjuvant radiotherapy, brain invasion, malignant progression, were significantly associated with survival and recurrence” [2]. However, brain invasion and malignant progression were negative prognostic factors and resulted in a great decrease in overall survival [2].

Due to their high rates of recurrence, the treatment of grade II and III meningiomas should be surgery supplemented with another treatment modality such as radiation therapy [2]. In this case, a Simpson grade II resection was achieved and the patient was given adjuvant radiotherapy.

However, adjuvant radiotherapy is not recommended in case of complete resection of an atypical meningioma that does not show any evidence of brain invasion. Therefore, if incomplete resection or brain invasion were to be present, the patient might benefit from adjuvant therapy [4,16–19].

The use of radiotherapy is essential when dealing with an anaplastic meningioma, such as the case presented, and does not depend on the extent of resection [2], as in our case. If the tumor is found near a very critical location that makes resection unfavorable, the surgeon might opt for radiosurgery. Walcott et al. (2013) wrote that “Stereotactic radiosurgery provides the benefit of treating the entire lesion while minimizing the risk of a potentially catastrophic venous infarct or hemorrhage associated with open surgery” [15].

Anaplastic meningiomas can originate either *de novo* or from previously atypical or benign masses [3]. *De novo* tumors were usually located in the convexities, while anaplastic meningiomas originating from previously atypical or benign masses were mostly found in the skull base [3]. Tumors arising at the cranial base were found to be associated with high morbidity rates, as both surgical interventions as well as radiotherapy had their limitations [13,15]. In summary, Moliterno et al. (2015) showed that “Aggressive gross total resection (GTR), *de novo* status, and location along the convexity/parasagittal intracranial areas are associated with better overall survival (OS)” [3].

Meningiomas are highly vascular tumors, and it was noticed that more aggressive meningiomas tend to have high levels of angiogenesis and are more highly vascularized. Therefore, anti-angiogenic therapies might prove to be beneficial and are currently being explored [13,15]. VEGF mediates angiogenesis, especially in higher grades subtypes of meningiomas. The use of Bevacizumab, a humanized monoclonal antibody against VEGF, is being investigated because it has proven to be effective in the case of recurrent glioblastoma, an aggressive primary CNS tumor. It has also been shown that the levels of VEGF and VEGF-R (as well as microvessel density) increase with the grade of the meningiomas and may prove to be of prognostic significance [10,12,20].

Currently, there are no effective therapies for meningiomas that recur after surgery and radiation therapy; thus, such patients represent an unmet need in oncology at present. Therefore,

this diagnosis carries an unfavorable prognosis due to the high rate of recurrence and metastases. So far, our patient has not demonstrated any signs of recurrence. Moreover, chemotherapy has proven to be ineffective [4], and applications of cyclophosphamide, Adriamycin, and vincristine have also proven ineffective [3].

Conclusions

Most anaplastic meningiomas are located in the skull base or along the convexities. The literature has shown a scarcity of anaplastic meningiomas presenting as a left parietal mass. This unusual presentation was associated with typical presenting symptoms. Surgical resection proved to be the best method of treatment, and it remains as the mainstay of therapy for meningiomas.

Acknowledgments

This team acknowledges the work and contribution of Dr. Fouad Boulos for providing and analyzing histological slides and Mr. Christopher El Mouhayyar for writing and researching for the paper.

Conflict of interest

None.

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