

# Extensive Pulmonary Metastases of Intracranial Anaplastic Meningioma: Case Report

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**How to cite this paper:** Imoumby, F.N., Mandour, C. and Gazzaz, M. (2021) Extensive Pulmonary Metastases of Intracranial Anaplastic Meningioma: Case Report. *Open Journal of Modern Neurosurgery*, 11, 102-106. <https://doi.org/10.4236/ojmn.2021.112012>

**Received:** January 25, 2021

**Accepted:** April 24, 2021

**Published:** April 27, 2021

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## Abstract

Most meningiomas are benign; however anaplastic meningiomas are usually highly invasive and grow rapidly. These tumors can metastases outside the blood-brain barrier occurring to the lungs. We present an unusual case of multiple pulmonary metastases from anaplastic and recurrent intracranial meningioma in a 59-year-old male patient. Multiple pulmonary metastases from meningioma are very rare, but we should be aware of this possibility in patients with intracranial malignant meningioma especially, with potential predictive factors include anaplastic meningioma, venous sinus invasion, recurrence or previous intracranial surgery, and loss of heterozygosity.

## Keywords

Anaplastic, Lung, Metastases, Meningioma

## 1. Introduction

Meningiomas are tumors originating from meningotheial cells of the arachnoid membrane and represent the second most common primary intracranial neoplasms, approximately 13% - 26% [1]. Anaplastic meningiomas represent only 2% - 3% of all meningiomas and demonstrate more aggressive characteristics with increased mortality, the likelihood of recurrence, poor prognosis, and metastases outside the blood-brain barrier occurring to the lungs, liver, bone, and skin [2]. Literature has described anaplastic meningioma as a rare type of adult cerebral tumor, but when it does occur, its metastatic potential is high and the lungs are known to be the first organ of concern. The lung is therefore the most common site of metastasis representing about 60%. Their management requires adjuvant

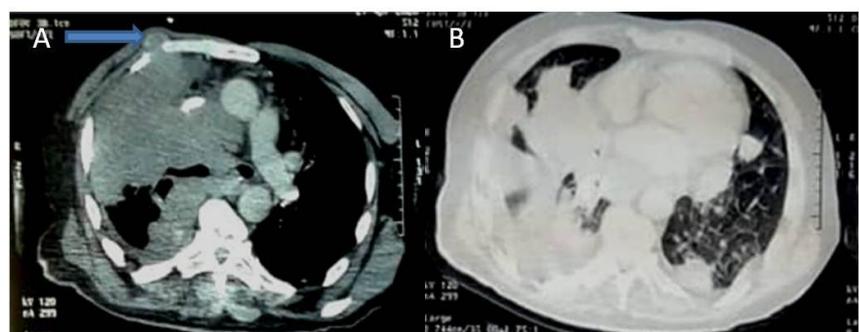
radiotherapy or radiosurgery to achieve tumor control. We report a case of a 59-year-old man with multiple pulmonary metastases from a recurrent intracranial malignant meningioma.

## 2. Case Report

A 59-year-old Moroccan man underwent a subtotal resection of an occipital atypical meningioma in October 2017 with radiotherapy (**Figure 1(A)**). In September 2019, tumor recurrence at the surgical site with the invasion of bone and subcutaneous tissue was diagnosed (**Figure 1(B)** and **Figure 1(C)**) and the pathological anatomy examination revealed an anaplastic meningioma (grade III). The patient was referred to the department of oncology. Second adjuvant radiotherapy was decided and performed without complications. Six months after the second surgical procedure, the patient developed dizziness, blurred vision, cough, fever, chest pain, and had difficulty breathing. A Computed Tomography scan of the thorax revealed a large mass with pleural effusion in the right lung and lymph nodes (**Figure 2(A)** and **Figure 2(B)**). A subsequent biopsy revealed cell neoplasm with pathology similar to findings from previous intracranial resection specimen (focal dot-like positive epithelial membrane antigen (EMA) stain, high MIB-1 proliferation index up to 45% in more active areas, glial fibrillary acidic protein (GFAP) staining suggestive of multifocal areas of invasion of



**Figure 1.** (A): post-operative brain computed tomography showing a subtotal resection of meningioma after the first surgery. (B): Sagittal and (C): Axial T1-weighted magnetic resonance imaging showing the tumor recurrence at the surgical site with invasion of bone and subcutaneous tissue.



**Figure 2.** (A) and (B): Computed tomography chest axial image of metastatic pulmonary meningioma. (The arrow shows the biopsy site).

the brain) suggestive of an anaplastic meningioma. This is a high potential recurrence meningioma that was refractory to surgery and radiotherapy; the general status of the patient worsened with a Karnofsky score from 50% at admission to 20% in few days. The case was discussed with the oncology team, and palliative care was retained. The patient was transferred to the palliative care unit where he died six weeks later.

### 3. Discussion

Anaplastic meningiomas are thought to be formed either *de novo* or via transformation of a pre-existing meningioma and the World Health Organization classifies meningiomas into three grades. Grade I is the most common and considered benign, while grade II (atypical) and grade III (anaplastic) are malignant tumors with aggressive behavior and a high rate of recurrence [3]. Most anaplastic meningiomas occur in adults, although some rare cases have been reported in children [4]. Anaplastic meningiomas are usually highly invasive and grow rapidly [5]. Histologically, anaplastic meningioma has to meet the following features: an elevated mitotic index (>20 mitosis/10HPF) or anaplastic cytology (resembling carcinoma, melanoma, or sarcoma), with or without brain invasion [6].

Lung metastasis from intracranial meningioma is rare. Especially the incidence of malignant meningioma metastasizing to other organs is less than 0.1% [7]. Especially, meningioma located in the parasagittal and falx region metastasized more frequently [7]. The mechanism of multiple pulmonary metastases from intracranial meningiomas is unclear but the most possible routes were hematogenous (venous channels), lymphomatous, or cerebrospinal fluid spread [8]. The time frame from initial surgical excision to the diagnosis of metastases can range from few months to 15 years, and a large proportion of metastases will only be diagnosed after the recurrence of the primary tumor [8]. The most common sites of metastases of meningiomas are the lungs (60%), followed by the abdomen and liver (34%), cervical lymph nodes (18%), long bones, pelvis and skull (11%), pleura (9%), vertebrae (7%), CNS (7%), and mediastinum (5%) [9]. Many authors described that the standard treatment method of pulmonary metastasis of malignant meningioma was surgical resection for either the primary or metastatic lesions [10], however to date, there is no consensus for optimal treatment of extensive pulmonary metastatic meningioma. Patients are usually received radiotherapy and chemotherapy, despite their limited efficacy in overall survival [11] [12]. The mean survival time after initial diagnosis is less than 2 years [8].

### 4. Conclusion

Anaplastic meningioma is a malignant meningioma subtype with malignant morphological features, characterizes for intracranial recurrence and extracranial metastasis. Although uncommon, this case report highlights the importance of

considering metastatic pulmonary meningioma as a differential diagnosis, especially for patients who underwent surgery and presented tumor recurrence.

### Author Contributions

**Fernand Nathan Imoumy:** Conceptualization, writing an original draft, & editing. **Cherkaoui Mandour:** Writing, review & editing. **Miloudi Gazzaz:** Supervision, review & validation.

### Ethics

Informed consent was obtained from the family of the patient prior to the submission of this article.

### Conflicts of Interest

The authors declare not having any conflict of interest in this case report and there are no financial resources.

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