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Case Report

Atypical Metastatic Meningioma Presenting with Multifocal Lesions, Intratumoural Hemorrhage and Lung Metastases: A Case Report

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- *Brain tumour*
- *WHO classification*

Abstract

Background: Atypical meningiomas (WHO grade II) behave more aggressively than benign variants, with an increased frequency of recurrence and local brain invasion. However, distant extracranial spread is extremely rare. We present a case of metastatic atypical meningioma in a 32-year-old patient.

Case Presentation: A 32-year-old man presented with progressive right-sided weakness, headaches, and seizures. Clinical examination revealed a non-tender paramedian scalp swelling with normal overlying skin. Neuroimaging demonstrated a heterogeneous right frontal parafalcine extra-axial lesion with haemorrhagic components, vasogenic oedema, mass effect, and transosseous extension with calvarial erosion. A second smaller lesion was identified in the left temporal region with similar bone erosion. Computed tomography of the chest revealed multiple pulmonary nodules consistent with metastases. Histopathological evaluation of both brain and lung biopsy specimens demonstrated an atypical (fibroblastic) meningioma. While awaiting surgical intervention, the patient developed a massive intratumoural haemorrhage and multiple additional intracranial lesions within two months of diagnosis and subsequently died on admission.

Conclusion: Although meningiomas are predominantly benign, atypical (WHO grade II) meningiomas may present with multifocal intracranial disease, distant metastases, intratumoural haemorrhage, and calvarial bone erosion, as demonstrated in this case. Early diagnosis and timely surgical and adjuvant therapy are essential to reduce associated morbidity and mortality.

Introduction

Meningiomas comprise approximately 30% of primary tumours of the central nervous system and constitute the largest group of extra-axial neoplasms of the brain (Ostrom et al., 2021). While most meningiomas are benign, atypical meningiomas (WHO Grade II) exhibit increased proliferation with a high incidence of recurrence and brain invasion (Louis et al., 2021; Nasrallah & Aldape, 2023)). In addition to biological aggressiveness, atypical meningiomas exhibit various radiographic and pathological features such as tumour heterogeneity, haemorrhage, necrosis, and extensive peritumoural oedema (Maiuri & Del Basso de Caro, 2023). Although traditionally considered non-metastatic neoplasms, increasing attention has recently been paid to extracranial and distant metastases of meningioma occurring in higher-grade lesions (Surov et al., 2013). Cranial bone involvement in the form of hyperostosis has been well described in meningiomas; however, destructive calvarial invasion and extracranial extension remain very rare and are typically associated with more aggressive tumour (Goldbrunner et al., 2021; Ogasawara et al., 2021). Such presentations complicate diagnostics considerably, particularly in differentiating primary intracranial tumours from lesions with secondary skull involvement. Our case represents a unique opportunity for the analysis of a highly aggressive lesion that combines numerous radiological and pathological features, including extensive calvarial invasion, intracranial and extracranial spreading, a combination of intra-tumoural bleeding and tumour heterogeneity, and distant lung metastases.

Case presentation

A 32-year-old man presented with a one-year history of painless scalp swelling, which had progressively increased in size and was associated with worsening headaches over the preceding six months. He presented acutely following the onset of generalized tonic–clonic seizures accompanied by right-sided weakness. On examination, there was cranial asymmetry with a firm, non-tender mass in the left frontoparietal region extending across the midline, measuring approximately 6 × 3 cm, with intact overlying skin. Neurological examination revealed right-sided hemiparesis.

A non-contrast computed tomography (CT) scan of the brain demonstrated a heterogeneous hyperdense extra-axial mass in the right frontal parafalcine region, associated with marked vasogenic oedema, intratumoural haemorrhagic components, and significant mass effect with midline shift. There was clear evidence of transosseous extension with calvarial destruction and extracranial soft tissue involvement. An additional 2 × 2 cm lesion was identified in the contralateral temporoparietal region, also associated with focal bone erosion (**Figure 1**). These findings raised suspicion for an aggressive neoplastic process with possible metastatic disease rather than a typical solitary meningioma.

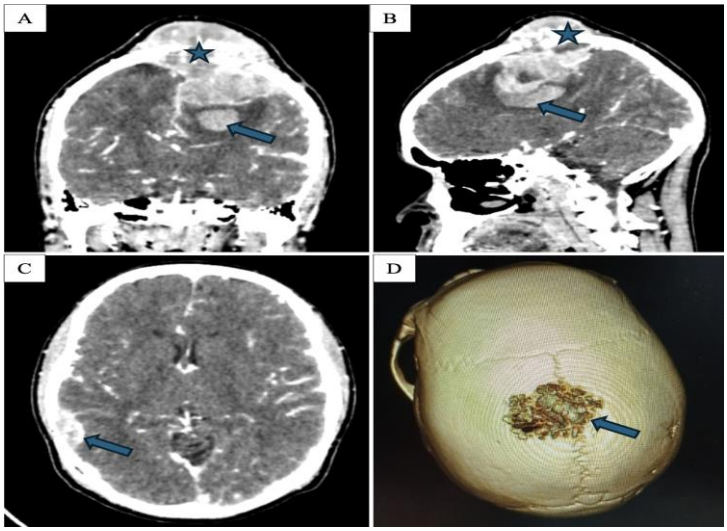

Figure 1: Initial computed tomography – A: Coronal view and B: Sagittal – showing a 6 × 3 × 4 cm tumour in

the right parafalcine region with erosion of the skull and intratumoural haemorrhage (arrow); C: Axial view showing a 2 × 2 cm lesion in the left temporoparietal region with bone erosion. D: 3D reconstruction demonstrating calvarial destruction by the tumour.

A systemic evaluation to identify a possible primary malignancy was undertaken. Thyroid ultrasonography was unremarkable, and clinical examination did not reveal features suggestive of melanoma or other primary tumours. Contrast-enhanced CT of the chest, abdomen, and pelvis did not identify a primary malignancy; however, multiple bilateral pulmonary nodules were detected (**Figure 2**), raising suspicion for metastatic disease. These lesions were subsequently biopsied.

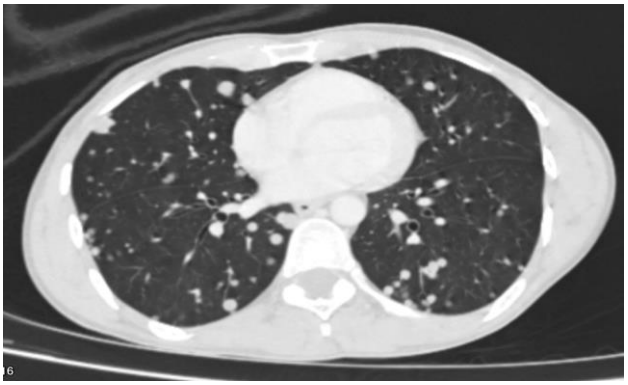

Figure 2: Contrast-enhanced CT of the chest showing multiple pulmonary nodules.

The patient was stabilised with anticonvulsant therapy using phenobarbitone, and cerebral oedema was managed with dexamethasone and mannitol. Following initial resuscitation, an incisional biopsy of the cranial lesion was performed. Histopathological examination demonstrated a densely cellular spindle-cell neoplasm arranged in fascicles, with increased mitotic activity and a collagenous stroma, consistent with atypical meningioma (WHO grade II). Histological evaluation of CT-guided biopsy specimens obtained from the pulmonary nodules demonstrated identical morphological of a densely cellular spindle-cell neoplasm composed of monomorphic spindle cells arranged in short intersecting fascicles and patternless sheets with scattered thin-walled vessels and focal collagen stroma **(figure 3).** Mitotic figures were identified (<10 per 10 high-power fields). Based on the morphological findings, the principal differential diagnoses included fibroblastic/atypical meningioma. And solitary fibrous tumour (SFT) immunohistochemistry (STAT6, SSTR2A and Ki67) was recommended to further classify the lesion but was unavailable because or resource limitations. However, after multidisciplinary clinicopathological correlation, the overall morphological features together with the radiological findings of the dura-based lesion with dural tail together with the concordant histology in both cranial and pulmonary biopsy favoured metastatic atypical meningioma. Nevertheless, the absence of immunohistochemistry confirmation introduces an acknowledged diagnostic uncertainty to some degree.

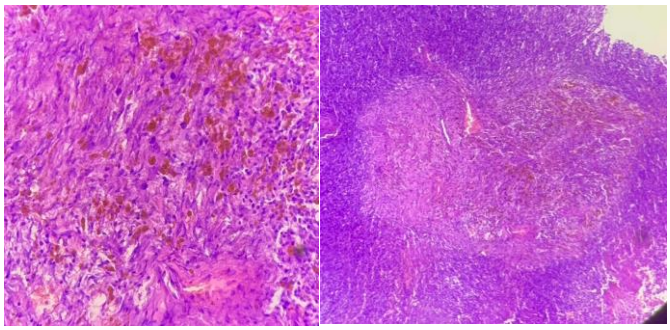

Figure 3: Histopathology slide showing features consistent with an atypical meningioma

For further surgical planning, contrast-enhanced magnetic resonance imaging (MRI) of the brain and magnetic resonance venography (MRV) were performed to evaluate the relationship of the tumour to adjacent vascular structures. MRI demonstrated a heterogeneously enhancing right frontal parafalcine mass with mixed signal intensity, areas of intratumoural

haemorrhage, extensive vasogenic oedema, and significant mass effect. The lesion exhibited a broad dural attachment with a dural tail sign. MRV revealed compression and displacement of the superior sagittal sinus without clear evidence of intraluminal invasion, indicating mass effect rather than direct sinus infiltration (**Figure 4**).

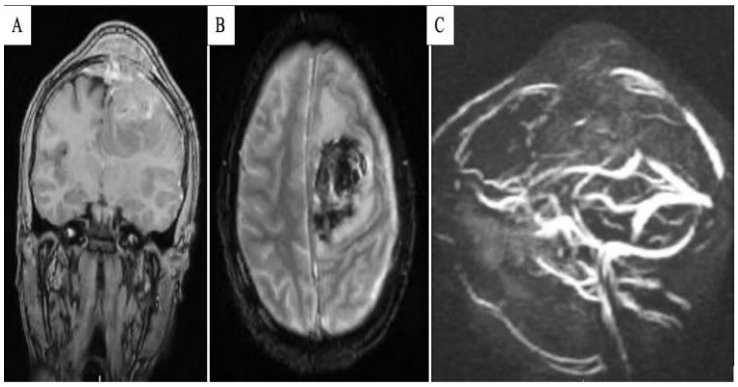

Figure 4: Brain contrast-enhanced MRI and MRV. A: Coronal view demonstrating a heterogeneously enhancing parafalcine tumour with a dural tail. B: Susceptibility-weighted imaging showing blooming consistent with intratumoural haemorrhage. C: MRV demonstrating compression and displacement of the middle third of the superior sagittal sinus without definite intraluminal invasion.

Despite initial stabilisation and plans for surgical resection followed by adjuvant therapy, the patient's clinical condition deteriorated rapidly during the preoperative period. Approximately two months after initial presentation, he developed acute neurological decline. A repeat non-contrast CT scan demonstrated a massive intratumoural haemorrhage with significant expansion of the primary lesion, as well as the appearance of multiple additional intracranial lesions (**Figure 5**), consistent with aggressive disease progression. The patient died shortly after readmission before definitive surgical intervention could be undertaken.

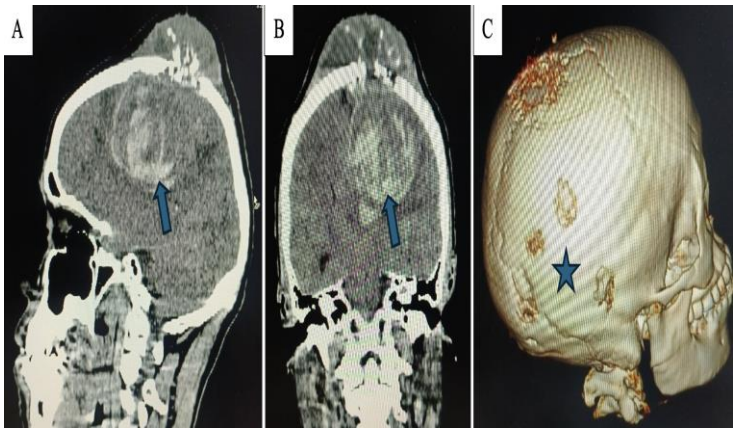

Figure 5: Non-contrast CT of the brain demonstrating a massive intratumoural haemorrhage. 3D reconstruction shows multiple skull lesions consistent with aggressive multifocal disease.

Timeline

The patient initially noticed painless scalp swelling approximately 12 months prior to presentation. Six months before admission, he developed progressively worsening headaches. At presentation (month 0), he experienced new-onset generalized seizures and right-sided weakness, prompting hospital evaluation. Initial CT imaging identified a large parafalcine lesion with a second contralateral lesion, followed shortly by systemic imaging that revealed pulmonary nodules. Within the first week of admission, the patient was stabilised medically and underwent cranial biopsy, with subsequent lung biopsy confirming metastatic atypical meningioma. Within two to three weeks, MRI and MRV were performed for surgical planning. Despite stabilisation, the patient's condition deteriorated over the following weeks. Approximately two months after initial presentation, repeat imaging demonstrated massive intratumoural haemorrhage and multiple new intracranial lesions, and the patient died shortly thereafter before definitive treatment could be performed. Summary of events are shown in **Table 1.**

TIME	CLINICAL EVENT
12 months before admission	Progressive painless scalp swelling
6 months before admission	Worsening headache
Day 0	Seizures and right hemiparesis
Day 1	CT brain showed multifocal lesions with calvarial erosions
Week 1	Cranial biopsy and CT chest showed pulmonary metastases
Week 2	Lung biopsy confirmed pulmonary metastases
Week 2- 3	MRI and MRV for surgical planning
2 Months +	Massive intratumoural haemorrhage, multiple new lesions, death before palliation interventions

Discussion

Atypical meningiomas (WHO grade II) are defined by increased mitotic activity and/or specific histopathological features and are associated with a higher risk of recurrence and invasive behaviour compared with grade I tumours (Louis et al., 2021). In the present case, the tumour demonstrated a fibroblastic phenotype with increased mitotic activity, consistent with an atypical meningioma. However, the clinical course and radiological features indicate a level of biological aggressiveness that exceeds what is typically expected for WHO grade II lesions.

An important differential diagnosis in our case presentation is solitary fibrous tumour (SFT), particularly because both tumours may demonstrate spindle-cell morphology and aggressive features like, calvarial destruction, extracranial extension and pulmonary metastases. The 2021 WHO classification recognises SFT and hemangiopericytoma as a single mesenchymal tumour entity characterised by NAB2-STAT6 gene fusion and nuclear STAT6 expression. In our patient, the histology report favoured a spindle-cell neoplasm with differential diagnosis of fibroblastic/ atypical meningioma and SFT and specifically recommended STAT6, SSTR2A and Ki67 immunohistochemistry for definitive classification. Unfortunately, these investigations were unavailable due to resource limitations. Diagnosis favoured atypical meningioma based on the radiological presence of a dural-based lesion with a dural tail together with histomorphological findings reported by the pathologist. However, because immunohistochemistry and molecular studies were not available, SFT/HPC cannot be completely be excluded. This limitation should be considered when interpreting our findings and reflects the diagnostic challenges encountered in resource limited settings (Chmielecki et al., 2013; Louis et al., 2021).

Although meningiomas are traditionally regarded as benign and non-metastatic, extracranial dissemination is a recognised but rare phenomenon, occurring more frequently in higher-grade or recurrent tumours (Caris, 2021;Maiuri & Del Basso de Caro, 2023), 2005; Surov et al., 2013). The lungs represent the most common site of metastasis, likely reflecting haematogenous spread via venous channels. In this case, the diagnosis of metastatic disease is supported by histological concordance between the intracranial lesion and pulmonary nodules. This finding underscores the need to consider metastatic meningioma in the differential diagnosis when extracranial lesions are identified in patients with atypical or aggressive-appearing intracranial tumours.

A key observation in this case is the discordance between histological grade and clinical behaviour. Increasing evidence suggests that tumour biology in meningiomas cannot be fully captured by histopathological grading alone, with radiological and intraoperative features providing critical complementary information (Nasrallah & Aldape, 2023). The presence of multifocal intracranial lesions, destructive calvarial invasion, extracranial extension, and distant metastases collectively indicates a highly aggressive phenotype. Radiologically, features such as heterogeneous enhancement, intratumoural haemorrhage, necrosis, and extensive vasogenic oedema are associated with higher-grade disease and were all evident in this patient (Franca et al., 2023).

Calvarial involvement in meningiomas most commonly manifests as hyperostosis; however, destructive bone erosion, as seen in this case, is uncommon and suggests direct tumour infiltration with transosseous extension (Ogasawara et al., 2021). The coexistence of calvarial destruction and extracranial soft tissue extension further supports an aggressive growth pattern. Importantly, the distinction between direct extension and true metastasis is critical. In this patient, imaging findings support both mechanisms: transosseous local invasion accounting for skull and extracranial involvement, and haematogenous dissemination explaining the pulmonary metastases. Similar cases of aggressive meningioma with bone destruction and extracranial spread have been reported, although they remain rare (Sawafta et al., 2025).

Multifocal intracranial disease presents an additional diagnostic challenge, as it may represent synchronous primary lesions, local dissemination, or metastatic spread. Emerging evidence suggests that multifocality and extracranial extension may occur even in lower-grade meningiomas, reflecting underlying biological heterogeneity (Song et al., 2023). In the present case, the rapid progression and development of new intracranial lesions strongly favour aggressive dissemination rather than independent tumour formation.

Advanced imaging further supported the aggressive nature of the tumour. MRI demonstrated marked heterogeneity, haemorrhagic components, and extensive oedema, findings consistent with blood–brain barrier disruption and increased vascular permeability. Intratumoural haemorrhage, although uncommon in meningiomas, has been associated with higher-grade lesions and may reflect vascular fragility within rapidly proliferating tumours. MR venography revealed compression and displacement of the superior sagittal sinus without definitive intraluminal invasion, an important distinction in surgical planning, as sinus invasion is associated with increased operative complexity and morbidity.

From a therapeutic perspective, maximal safe resection remains the cornerstone of management for atypical meningiomas (Goldbrunner et al., 2021). Adjuvant radiotherapy is recommended, particularly following subtotal resection, and has been shown to improve local control and progression-free survival (Goldbrunner et

al., 2021; Yarabarla et al., 2023). Systemic therapies have limited efficacy and are generally reserved for refractory disease. In this case, the fulminant clinical course precluded definitive surgical and adjuvant treatment, highlighting the potential for rapid deterioration in aggressive variants.

This case also reflects the challenges encountered in resource-limited settings, where access to advanced diagnostics such as immunohistochemistry and timely multimodal therapy may be constrained (Maiuri & Del Basso de Caro, 2023). Such limitations may contribute to delayed diagnosis and advanced-stage presentation, ultimately impacting outcomes.

To our knowledge, this case represents one of the few reported atypical (WHO grade II) meningiomas presenting simultaneously with multifocal intracranial disease, destructive calvarial invasion, pulmonary metastases, and fatal intratumoural haemorrhage in a young adult. The coexistence of all these aggressive features in a single patient makes this presentation exceptionally rare.

Conclusion

Although meningiomas are predominantly benign, atypical (WHO grade II) meningiomas may present with multifocal intracranial disease, distant metastases, intratumoural haemorrhage, and calvarial bone erosion, as demonstrated in this case. Early diagnosis and timely surgical and adjuvant therapy are essential to reduce associated morbidity and mortality.

References

1. Ostrom, Q. T., Cioffi, G., Waite, K., Kruchko, C., & Barnholtz-Sloan, J. S. (2021). CBTRUS Statistical Report: Primary Brain and Other Central Nervous System Tumours Diagnosed in the United States in 2014–2018. *Neuro-Oncology*, *23*(Supplement_3), iii1–iii105. https://doi.org/10.1093/neuonc/noab200
2. Louis, D. N., Perry, A., Wesseling, P., Brat, D. J., Cree, I. A., Figarella-Branger, D., Hawkins, C., Ng, H. K., Pfister, S. M., Reifenberger, G., Soffietti, R., von Deimling, A., & Ellison, D. W. (2021). The 2021 WHO Classification of Tumours of the Central Nervous System: a summary. *Neuro-Oncology*, *23*(8), 1231–1251. https://doi.org/10.1093/neuonc/noab106
3. Surov, A., Gottschling, S., Bolz, J., Kornhuber, M., Alfieri, A., Holzhausen, H.-J., Abbas, J., & Kösling, S. (2013). Distant metastases in meningioma: an underestimated problem. *Journal of Neuro-Oncology*, *112*(3), 323–327. https://doi.org/10.1007/s11060-013-1074-x
4. Goldbrunner, R., Stavrinou, P., Jenkinson, M. D., Sahm, F., Mawrin, C., Weber, D. C., Preusser, M., Minniti, G., Lund-Johansen, M., Lefranc, F., Houdart, E., Sallabanda, K., Le Rhun, E., Nieuwenhuizen, D., Tabatabai, G., Soffietti, R., & Weller, M. (2021). EANO guideline on the diagnosis and management of meningiomas. *Neuro-Oncology*, *23*(11), 1821–1834. https://doi.org/10.1093/neuonc/noab150
5. Caris, C. (2021). Metastatic Meningioma: A Case Report and Literature Review. *Insights of Neuro Oncology*, *4*(1). https://doi.org/10.36959/828/336
6. Paul, A., Johnson, S., & Patel, S. M. (2025). Recurrence of Atypical Meningioma: A Case Report. *Cureus*. https://doi.org/10.7759/cureus.94686
7. Sawafta, O., Khamaysa, J., Hamdan, D., Hajjeh, O., Zeidalkilani, J. M. J., & Abuali, A. (2025). Skull bone erosion in a silent atypical meningioma: A case report and literature

review. *International Journal of Surgery Case Reports*, *135*, 111851. https://doi.org/10.1016/j.ijscr.2025.111851

8. Javed, S., Khan, A., Khalid, A., Scalia, G., Umana, G. E., Mahmood, A., Yaqoob, E., Pahwa, B., & Chaurasia, B. (2024). Scalp metastasis from atypical meningioma: A case report and literature review. *Clinical Case Reports*, *12*(5). https://doi.org/10.1002/ccr3.8789
9. Song, Y., Hu, M., Wang, X., Fang, Q., Xiao, X., & Gong, L. (2023). Atypical meningiomas with multiple extracranial metastases: a case description. *Quantitative Imaging in Medicine and Surgery*, *13*(12), 8853–8858. https://doi.org/10.21037/qims-23-565
10. Yarabarla, V., Mylarapu, A., Han, T. J., McGovern, S. L., Raza, S. M., & Beckham, T. H. (2023). Intracranial meningiomas: an update of the 2021 World Health Organization classifications and review of management with a focus on radiation therapy. *Frontiers in Oncology*, *13*. https://doi.org/10.3389/fonc.2023.1137849
11. WHO Classification of Tumours Editorial Board. (2021). *Central Nervous System Tumours* (5th ed., Vol. 6). International Agency for Research on Cancer, Lyon, France.
12. Chmielecki, J., Crago, A. M., Rosenberg, M., O'Connor, R., Walker, S. R., Ambrogio, L., Auclair, D., McKenna, A., Heinrich, M. C., Frank, D. A., & Meyerson, M. (2013). Whole-exome sequencing identifies a recurrent NAB2-STAT6 fusion in solitary fibrous tumors. *Nature Genetics*, *45*(2), 131–132. https://doi.org/10.1038/ng.2522