Vol. 8 | 20
Nº 4 | 21 | International Journal of
Medical and Surgical Sciences

UNIVERSIDAD AUTONOMA DE CHILE
MÁS UNIVERSIDAD

Article

Exceptionally rapid recurrence of malignant meningioma: case report

Recurrencia excepcionalmente rápida de meningioma maligno: reporte de caso

Francisco J. Arrambide-Garza
Universidad Autonoma de Nuevo Leon, School of Medicine, Human Anatomy Department, Monterrey, Nuevo León, México

Arnulfo Gómez-Sánchez
Universidad Autonoma de Nuevo Leon, School of Medicine, Human Anatomy Department, Monterrey, Nuevo León, México

Santos Guzmán-López
Universidad Autonoma de Nuevo Leon, School of Medicine, Human Anatomy Department, Monterrey, Nuevo León, México

Alejandro Quiroga-Garza
Universidad Autonoma de Nuevo Leon, School of Medicine, Human Anatomy Department, Monterrey, Nuevo León, México

Rodrigo E. Elizondo-Omaña
Universidad Autonoma de Nuevo Leon, School of Medicine, Human Anatomy Department, Monterrey, Nuevo León, México

Corresponding author: *Rodrigo E. Elizondo-Omaña M.D., Ph. D.*
Human Anatomy Department, Faculty of Medicine and University Hospital "Dr. José Eleuterio González", Universidad Autónoma de Nuevo León (UANL), Monterrey, Nuevo León, México.
E-mail: rod_omana@yahoo.com

Receipt: 15/11/2021
Acceptance: 30/12/2021

doi: 10.32457/ijmss.v8i4.1730

ABSTRACT
Anaplastic meningioma represents less than 5% of all meningiomas. It is a neoplasm with a poor prognosis due to aggressiveness and a high rate of recurrence. Patients could remain asymptomatic but clinical characteristics of mass effect are the most common presentation. Although diagnosis is made with histological study, this method is difficult to define, with inter-observer variability. When possible, surgical resection is the primary management. We discuss a case of an adult female patient with tonic-clonic seizures and weakness attributed to an anaplastic meningioma in the occipital lobe. The patient was treated with a parietal craniotomy with complete resection. One month later the patient suffered a recurrence of the tumor with the need for further intervention with incomplete resection. Due to extent of the damage the patient deceased two weeks later.

Keywords: Anaplastic meningioma; Pathology; Radiology; Surgery; Case report.

1. Introduction

Meningiomas constitute in adults the most common neoplasm in the central nervous system and one-third of all primary intracranial tumors (Backer-Grøndahl, Moen, & Torp, 2012). The World Health Organization (WHO) classifies meningiomas into grade I (benign), grade II (atypical), and grade III (anaplastic or malignant) according to the histopathological features (Louis *et al.*, 2021). The majority of meningiomas are classified as benign, but nearly 5% are anaplastic subtypes. The histological criteria for diagnosis of anaplastic meningiomas are high mitotic activity (more than 20 high-power fields), cytology like carcinoma, high grade of sarcoma, papillary, or rhabdoid morphology (Hanft, Canoll, & Bruce, 2010). Besides the histological study for the diagnosis and differentiation, radiologists must describe the characteristics of meningiomas, to determine if it suggests aggressiveness, evaluate invasion to intracranial structures, and oriented to neurosurgeons for surgical planning. The effectiveness of management according to the characteristics of the tumor and the clinical state of the patient is still controversial. Gross total resection (GTR) is considered the primary treatment for the majority of anaplastic meningiomas. The overall survival is mainly associated with the level of resection and administration of radiotherapy (Dobran *et al.*, 2020).

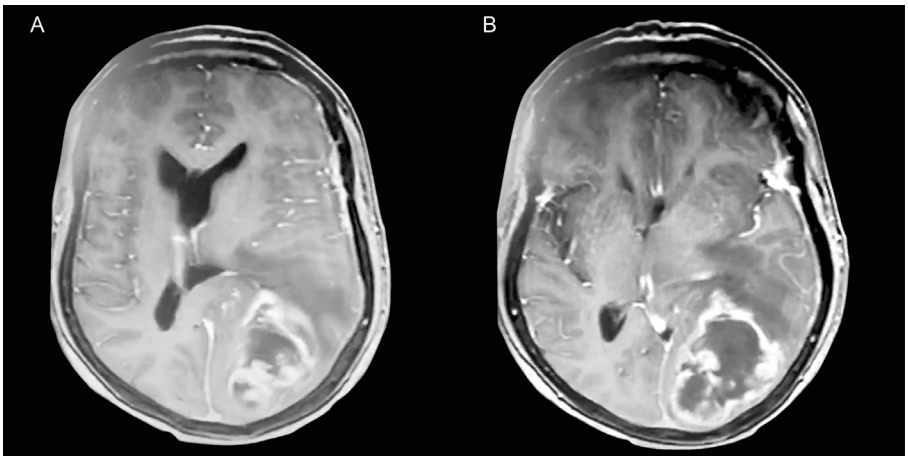
We report the clinical presentation of a case of an anaplastic meningioma in a female adult that causes pyramidal weakness due to mass effect. The diagnosis, treatment, and outcome are reviewed with available options described in the literature.

2. Case Report

A 60-year-old woman with a past medical history of neurology disorder due to neonatal hypoxia presented to the emergency department after an episode of a tonic-clonic seizure. Her neurological examination revealed intact cognition, no speech abnormality, however, the patient presented grade 4 right-sided pyramidal weakness. She denied head trauma or illicit drug ingestion. Routine blood tests and chest X-rays were normal. A head CT scan was reported without evident pathological findings (no evidence of mass or hemorrhage), an electroencephalogram was not deemed necessary at the moment. She was treated with phenytoin 300 mg per day, the patient improved rapidly within the following 5 hours, and by the next day, she had no residual symptoms and was continued with surveillance and management as an out-patient. Three month later she developed another episode of tonic-clonic seizure. The T1-weighted gadolinium-enhanced sequence showed a left occipital mass with heterogeneous enhancement with extensive edema surrounding it (Figure 1). The patient was scheduled for parietal craniotomy with complete resection, the tumor was well-demarcated with soft

parts and calcifications. Transoperative histopathology reported mass extraction with tumor-free borders. Postoperative examination revealed highly mitotic activity, hypercellularity, and anaplastic characteristics, data compatible with rhabdoid Grade III meningioma. Postoperatively, the patient was neurologically intact, she stayed in the intensive care unit for two days with normal intracranial pressure. The patient was discharged one week later without complications and was scheduled for radiotherapy. One month later the patient developed progressive right-sided weakness. Brain MRI showed a new mass in the same area with diffuse contrast enhancement and vasogenic edema. The patient underwent a second surgery with incomplete resection of the tumor. The transoperative histopathology report showed similar features to the first one. Due to the poor prognosis for the patient, no further surgical management was indicated due to patient safety and to preserve the quality of life. The patient demise two weeks later.

Figure 1. A.
Early preoperative brain T1-weighted gadolinium-enhanced MRI shows a heterogeneous extra-axial mass with irregular margin in left occipital lobe producing ventricular displacement. B. One month after resection surgery, a similar size tumor is revealed.



3. Discussion

Malignant meningiomas represent approximately 5% of all meningiomas and an incidence of fewer than 5 cases for 1 000 000 population per year (Darlix *et al.*, 2017). It affects mostly men around the 6th and 7th decades and is rare in children. Contrary to benign meningiomas, malignant subtypes present unfavorable prognoses due to a high recurrence rate and rapid growth. Patients could be asymptomatic, but the most common clinical characteristics include headache, seizure, and weakness attributable to mass effect. Although these neoplasms are classified as malignant, metastases are infrequent. However, if present, they are most common in the lung and liver (Jääskeläinen, Haltia, Laasonen, Wahlström, & Valtonen, 1985; Wiemels, Wrensch, & Claus, 2010).

There are 15 histological subtypes, meningothelial, fibrous and transitional meningiomas represent 80% of these. The histological subtypes in grade III meningiomas are papillary or rhabdoid. The treatment and prognosis depend strongly on the grade of meningioma, but the histological study continues to be vague, and studies have shown inter-observer differences despite all changes in criteria histopathology diagnosis through the years (Wilson *et al.*, 2020). Willis reported retrospectively 314 meningioma tumors where 38.1% of tumors grade II and III were wrongly classified as grade I.

Only the histological classification does not help in determining the aggressiveness and recurrence of the tumor. Pathologists struggle to differentiate between sarcoma, melanoma, or carcinoma. In these cases, an immunohistochemistry (IHC) analysis is useful. IHC markers for diagnosis are epithelial membrane antigen (EMA) and progesterone receptors (PR). All these elements suggest that the origin of the tumor corresponds to the arachnoid membrane (Boulagnon-Rombi *et al.*, 2017; Willis *et al.*, 2005).

There are no radiological criteria for distinguishing between the grade of meningiomas. Classifying a meningioma only with imaging criteria is often a challenge for radiologists due to the characteristics of a typical meningioma such as a well-circumscribed, extra-axial mass lesion with a dural base (Kunimatsu *et al.*, 2016). Anaplastic meningioma has irregular tumor margins, heterogeneous appearance, peritumoral edema, bone invasion, necrosis, invasion to the adjacent brain, and lack of enhancement of margins. Meningioma can appear in any site with meningothelial cells, the most common are the convexities, parasagittal, lesser sphenoid wing, posterior fossa, cerebellopontine angle, intraventricular, and orbital regions. However, anaplastic subtypes are more frequent in the convexity, than any other site. Radiology studies are considered complementary for diagnosis, prognosis, and surgical planning (Kawahara *et al.*, 2012).

The standard care for malignant meningiomas has yet to be established, the evaluation of prognosis factors is essential for choosing the optimal treatment. When possible, surgery is the first treatment to be considered. Simpson realized a classification of five categories according to the grade of resection (Simpson, 1957). Some observational studies showed that the extent of resection was associated with progression-free survival and a low rate of recurrence, but this evidence was reported before the widespread use of radiotherapy in malignant meningiomas (Kallio, Sankila, Hakulinen, & Jääskeläinen, 1992; Simpson, 1957; Stafford *et al.*, 1998).

Radiotherapy after surgical treatment is controversial, but some studies suggest local control of the tumor growth with adjuvant radiotherapy (Combs *et al.*, 2010). There are no clinical trials to establish the effectiveness of this treatment. Kaur reported a median 5-year progression-free survival of 54.2% and overall survival of 67.5% after adjuvant radiotherapy (Kaur *et al.*, 2014). Orton *et al.* reported a 5-years overall survival of 45% for patients with a total resection with adjuvant radiotherapy and 33% for patients with subtotal resection (Orton, Frandsen, Jensen, Shrieve, & Suneja, 2018).

Chemotherapy has shown limited clinical effectiveness in malignant meningiomas. The treatment options approved for The Food and Drug Administration only are used when the tumor shows refractory to the surgical resection and radiotherapy (Karsy, Guan, Cohen, Colman, & Jensen, 2016). Treatment options have been reported by interferon-alpha, somatostatin receptors inhibitors, and vascular endothelial growth factors, but they have demonstrated limited or no success in the treatment of meningioma (Chamberlain, Glantz, & Fadul, 2007; Kaba *et al.*, 1997; Wen *et al.*, 2009).

There is no difference in the risk of recurrence between the different treatment options. The prognosis factors for recurrence or progression of the malignant meningioma are the presence of Grade III histology, brain and/or bone invasion, high mitotic index, and parasagittal location. Kim *et al.* reported that 60% of patients had progression or recurrence 60 months after surgery and radiotherapy (Kim *et al.*, 2018). Our patient presented a Grade III tumor and high mitotic activity, therefore, had a high risk of recurrence. The patient only was treated with surgery and was waiting for radiotherapy sessions when the tumor recurred. In spite of a complete resection of the initial tumor (Simpson 1), an extremely rapid recurrence was presented at one month. More studies are necessary to demonstrate the role of the extent of surgical resection with and without radiotherapy in the rate of recurrence in patients with malignant meningiomas.

4. Conclusion

Prognosis in patients with malignant meningioma is related to the histopathological grade and extent of resection. Therefore, aggressive treatment is preferable in patients with these tumors. Unfortunately, redo surgery is common for these neoplasms, and the risk of surgical complications increased.

5. Ethical aspects:

The authors declare no financial or commercial gain for the realization of this study. The personal information of this patient was not revealed.

6. Funding:

This study was funded by Human Anatomy Department of the Universidad Autónoma de Nuevo León.

7. Conflict of interest:

The authors declare that they have no conflict of interest.

References

Backer-Grøndahl, T., Moen, B. H., & Torp, S. H. (2012). The histopathological spectrum of human meningiomas. *Int J Clin Exp Pathol, 5*(3), 231-242.

Boulagnon-Rombi, C., Fleury, C., Fichel, C., Lefour, S., Marchal Bressenot, A., & Gauchotte, G. (2017). Immunohistochemical Approach to the Differential Diagnosis of Meningiomas and Their Mimics. *J Neuropathol Exp Neurol, 76*(4), 289-298. doi:10.1093/jnen/nlx008

Chamberlain, M. C., Glantz, M. J., & Fadul, C. E. (2007). Recurrent meningioma: salvage therapy with long-acting somatostatin analogue. *Neurology, 69*(10), 969-973. doi:10.1212/01.wnl.0000271382.62776.b7

Combs, S. E., Hartmann, C., Nikoghosyan, A., Jäkel, O., Karger, C. P., Haberer, T., . . . Schulz-Ertner, D. (2010). Carbon ion radiation therapy for high-risk meningiomas. *Radiother Oncol, 95*(1), 54-59. doi:10.1016/j.radonc.2009.12.029

Darlix, A., Zouaoui, S., Rigau, V., Bessaoud, F., Figarella-Branger, D., Mathieu-Daude, H., . . . Bauchet, L. (2017). Epidemiology for primary brain tumors: a nationwide population-based study. *J Neurooncol, 131*(3), 525-546. doi:10.1007/s11060-016-2318-3

Dobran, M., Marini, A., Splavski, B., Rotim, K., Liverotti, V., Nasi, D., & Iacoangeli, M. (2020). Surgical Treatment and Predictive Factors for Atypical Meningiomas: A Multicentric Experience. *World Neurosurg, 144*, e1-e8. doi:10.1016/j.wneu.2020.03.201

Hanft, S., Canoll, P., & Bruce, J. N. (2010). A review of malignant meningiomas: diagnosis, characteristics, and treatment. *J Neurooncol, 99*(3), 433-443. doi:10.1007/s11060-010-0348-9

Jääskeläinen, J., Haltia, M., Laasonen, E., Wahlström, T., & Valtonen, S. (1985). The growth rate of intracranial meningiomas and its relation to histology. An analysis of 43 patients. *Surg Neurol, 24*(2), 165-172. doi:10.1016/0090-3019(85)90180-6

Kaba, S. E., DeMonte, F., Bruner, J. M., Kyritsis, A. P., Jaeckle, K. A., Levin, V., & Yung, W. K. (1997). The treatment of recurrent unresectable and malignant meningiomas with interferon alpha-2B. *Neurosurgery, 40*(2), 271-275. doi:10.1097/00006123-199702000-00007

Kallio, M., Sankila, R., Hakulinen, T., & Jääskeläinen, J. (1992). Factors affecting operative and excess long-term mortality in 935 patients with intracranial meningioma. *Neurosurgery, 31*(1), 2-12. doi:10.1227/00006123-199207000-00002

Karsy, M., Guan, J., Cohen, A., Colman, H., & Jensen, R. L. (2016). Medical Management of Meningiomas: Current Status, Failed Treatments, and Promising Horizons. *Neurosurg Clin N Am, 27*(2), 249-260. doi:10.1016/j.nec.2015.11.002

Kaur, G., Sayegh, E. T., Larson, A., Bloch, O., Madden, M., Sun, M. Z., . . . Parsa, A. T. (2014). Adjuvant radiotherapy for atypical and malignant meningiomas: a systematic review. *Neuro Oncol, 16*(5), 628-636. doi:10.1093/neuonc/nou025

Kawahara, Yosuke, Nakada, Mitsutoshi, Hayashi, Yutaka, Kai, Yutaka, Hayashi, Yasuhiko, Uchiyama, Naoyuki, . . . Hamada, Jun-ichiro. (2012). Prediction of high-grade meningioma by preoperative MRI assessment. *Journal of Neuro-Oncology, 108*(1), 147-152. doi:10.1007/s11060-012-0809-4

Kim, D., Niemierko, A., Hwang, W. L., Stemmer-Rachamimov, A. O., Curry, W. T., Barker, F. G., . . . Shih, H. A. (2018). Histopathological prognostic factors of recurrence following definitive therapy for atypical and malignant meningiomas. *J Neurosurg, 128*(4), 1123-1132. doi:10.3171/2016.11.JNS16913

Kunimatsu, A., Kunimatsu, N., Kamiya, K., Katsura, M., Mori, H., & Ohtomo, K. (2016). Variants of meningiomas: a review of imaging findings and clinical features. *Jpn J Radiol, 34*(7), 459-469. doi:10.1007/s11604-016-0550-6

Louis, D. N., Perry, A., Wesseling, P., Brat, D. J., Cree, I. A., Figarella-Branger, D., . . . Ellison, D. W. (2021). The 2021 WHO Classification of Tumors of the Central Nervous System: a summary. *Neuro Oncol, 23*(8), 1231-1251. doi:10.1093/neuonc/noab106

Orton, A., Frandsen, J., Jensen, R., Shrieve, D. C., & Suneja, G. (2018). Anaplastic meningioma: an analysis of the National Cancer Database from 2004 to 2012. *J Neurosurg, 128*(6), 1684-1689. doi:10.3171/2017.2.JNS162282

Simpson, D. (1957). The recurrence of intracranial meningiomas after surgical treatment. *J Neurol Neurosurg Psychiatry, 20*(1), 22-39. doi:10.1136/jnnp.20.1.22

Stafford, S. L., Perry, A., Suman, V. J., Meyer, F. B., Scheithauer, B. W., Lohse, C. M., & Shaw, E. G. (1998). Primarily resected meningiomas: outcome and prognostic factors in 581 Mayo Clinic patients, 1978 through 1988. *Mayo Clin Proc, 73*(10), 936-942. doi:10.4065/73.10.936

Wen, P. Y., Yung, W. K., Lamborn, K. R., Norden, A. D., Cloughesy, T. F., Abrey, L. E., . . . Prados, M. D. (2009). Phase II study of imatinib mesylate for recurrent meningiomas (North American Brain Tumor Consortium study 01-08). *Neuro Oncol, 11*(6), 853-860. doi:10.1215/15228517-2009-010

Wiemels, J., Wrensch, M., & Claus, E. B. (2010). Epidemiology and etiology of meningioma. *J Neurooncol, 99*(3), 307-314. doi:10.1007/s11060-010-0386-3

Willis, J., Smith, C., Ironside, J. W., Erridge, S., Whittle, I. R., & Everington, D. (2005). The accuracy of meningioma grading: a 10-year retrospective audit. *Neuropathol Appl Neurobiol, 31*(2), 141-149. doi:10.1111/j.1365-2990.2004.00621.x

Wilson, T. A., Huang, L., Ramanathan, D., Lopez-Gonzalez, M., Pillai, P., De Los Reyes, K., . . . Boling, W. (2020). Review of Atypical and Anaplastic Meningiomas: Classification, Molecular Biology, and Management. *Front Oncol, 10*, 565582. doi:10.3389/fonc.2020.565582

RESUMEN

El meningioma de tipo anaplásico representa menos del 5% de todos los meningiomas. Es una neoplasia de mal pronóstico debido a su agresividad y alta tasa de recurrencia. Los pacientes pueden permanecer asintomáticos, pero las características clínicas por el efecto de masa son la presentación más común. Aunque el diagnóstico se realiza con estudio histológico, este método es difícil de definir, con una variabilidad interobservador. Cuando sea posible, la resección quirúrgica es el tratamiento principal. Presentamos el caso de una paciente adulta con una presentación clínica de convulsiones tónico-clónicas y debilidad atribuida a un meningioma anaplásico en el lóbulo occipital. El paciente fue tratado con una craneotomía parietal con resección completa. Un mes después el paciente sufrió una recidiva del tumor con la necesidad de una nueva intervención con resección incompleta. Debido a la magnitud del daño, el paciente falleció dos semanas después.

Palabras clave: meningioma anaplásico; Patología; Radiología; Cirugía; Reporte de un caso.