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Radiotherapy

Atypical Meningioma: A Reported Case

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Abstract **Case Report**

Early studies of atypical meningiomas confirmed that total resection of meningiomas reduces recurrence compared with subtotal resection. These studies also provided the first evidence of the usefulness of radiotherapy as adjuvant treatment for subtotally resected atypical meningiomas. Radiotherapy of meningiomas is based on the principles of radiobiology, in particular the concept of biologically effective dose (BED) of radiation, the calculation of which makes it possible to compare different radiotherapy regimens. This case study aimed to demonstrate that radiation therapy is a real therapeutic alternative in the treatment of subtotally resected atypical meningiomas.

Keywords: Atypical meningioma; Radiation; Radiosurgery.

INTRODUCTION

Atypical meningiomas account for up to 8% of all meningiomas, and their incidence is increasing (> 5-10% among all types of meningioma). In recent decades, we have witnessed several important advances in both diagnosis and treatment. Surgery remains the cornerstone of treatment, with total excision often followed by adjuvant radiotherapy. The main problems encountered by practitioners are local recurrence and incomplete respectability. We report the case of a patient with atypical meningioma treated with conformational radiotherapy.

MATERIALS AND METHODS

We report the case of a 63-year-old woman, affected by atypical Meningioma treated conformational 3D radiotherapy at the oncology-radiotherapy department of the CHU Mohammed VI of Marrakech.

RESULTS

63-year-old WOMAN with history of diabetes 6 years ago and hypertension 4 years ago who presents with Symptoms: HTIC, generalized convulsive seizures + urine leakage + loss of consciousness + visual fog.

Clinical Examination

WHO 1, Hemodynamically and respiratory stable, no impairment of consciousness, coordination or behavior, Segmental and global strength preserved, no sensitivity disorders, no cranial nerve damage, no gait disorders, The rest of the examination was unremarkable.

Cerebral MRI

Right sphenotemporal extraaxial lesional tumoral process infiltrating the cavernous sinus and orbital apex with compressive subfalcoral involvement of 31.6*22*36 mm suggestive in the first instance of an atypical meningioma; signal abnormality of the supratentorial white matter associated with lacunae and microbleeds of vascular origin.

Operated and Pathology: Morphological appearance compatible with atypical meningothelial meningioma.

Post-op MRI: persistence of 35*31*34.7mm process infiltrating right cavernous sinus and sella turcica

The patient received a radiotherapy dose of 66 gray for fractionation: 2 gray per 33séance, the patient was in complete clinical and radiological remission.

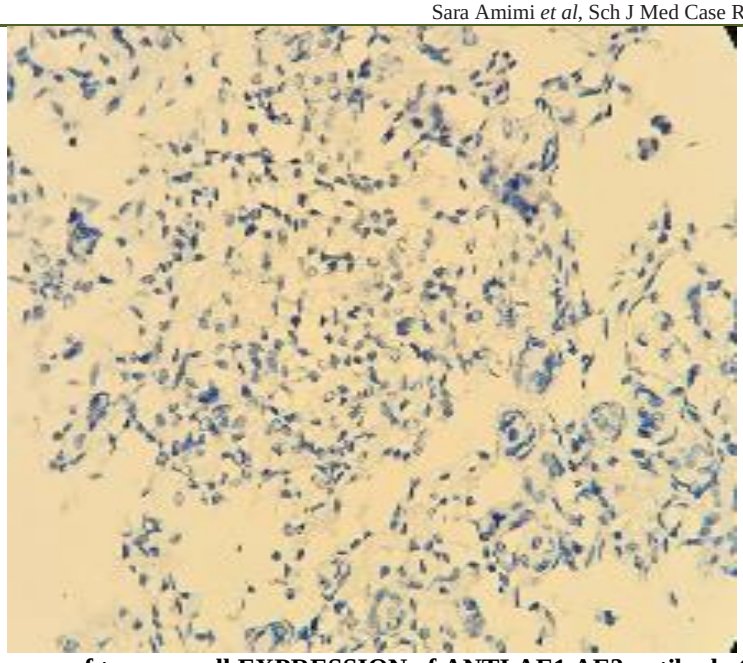

Figure 1: Absence of tumour cell EXPRESSION of ANTI AE1 AE3 antibody (cytokeratin)

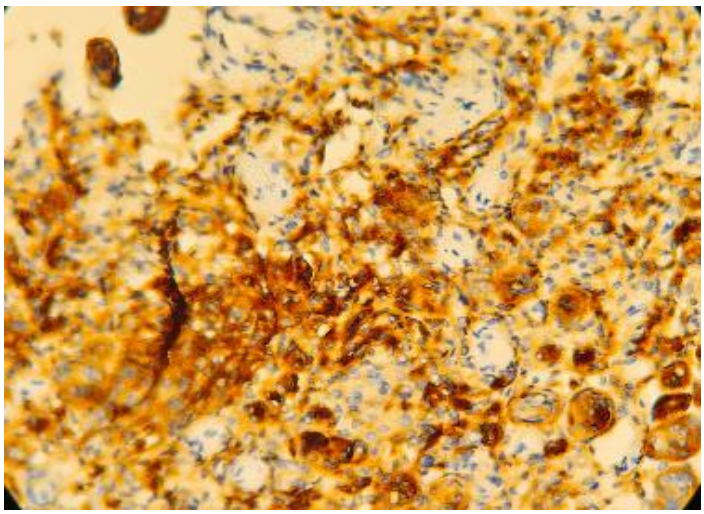

Figure 2: EXPRESSION OF tumor cells with EMA antibody (epithelial membrane antigen)

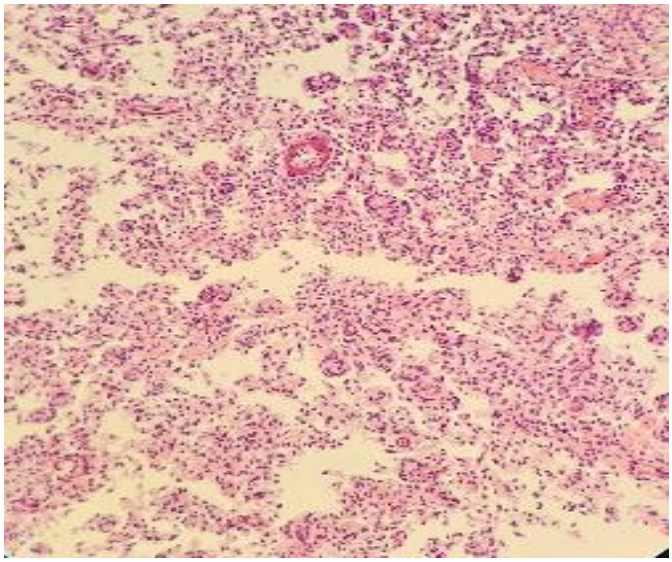

Figure 3: HE (Hematoxylin and eosin staining)

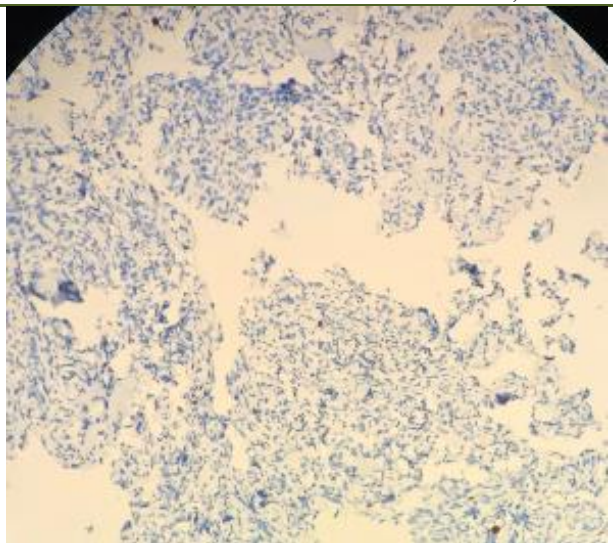

Figure 4: Expression of KI67 antibody in 2% of tumor cells

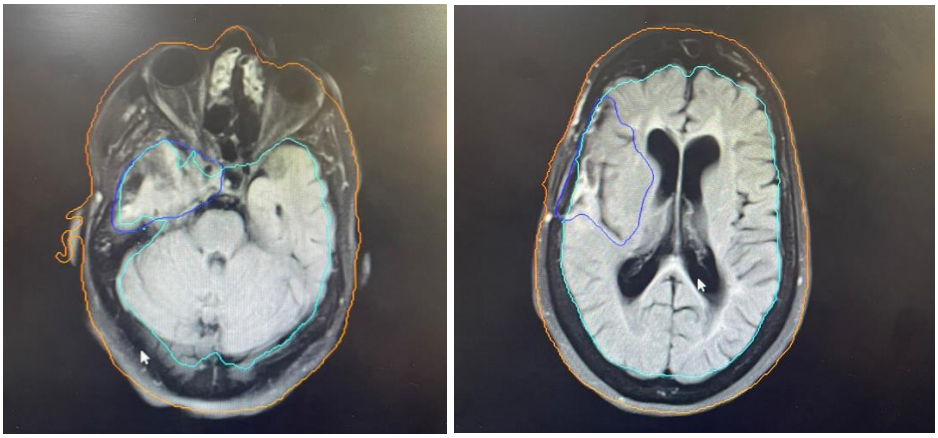

Figure 5+6: Contouring with target volumes Dark blue: CTV, Light blue: brain

DISCUSSION

For surgically untreatable meningiomas, irradiation represents a valid alternative to control local growth, but it is not as effective as surgery for symptom relief and it does not provide histological diagnosis. Different radiotherapy approaches can be used in the adjuvant setting after surgical resection or to treat disease recurrence: external beam radiotherapy (EBRT) and single-fraction stereotactic radiosurgery (SRS). Single-fraction SRS is typically used in meningiomas of 10 mm3, with up to five fractions, is associated with decreased complication rates (especially edema and necrosis) [2], probably due to the possibility of repair of the normal tissue between treatments [3]. SRS has been associated with a 5-year PFS of 58–83% in the recurrent or adjuvant setting for grade II meningiomas [2]. For recurrent grade III meningiomas or in the adjuvant setting, the use of SRS at median dose of 14 Gy has been reported to confer a 5-year PFS of 57% [4]. For brain-invasive meningiomas, EBRT is beneficial to maintain a larger radiation field to prevent local recurrence. Currently, there is no consensus on doses, fractioning and timing of radiotherapy in meningiomas due to the lack of Phase III randomized controlled trials. After surgery, adjuvant radiotherapy is aimed at decreasing the risk of recurrence and improving local control [1].

Adjuvant radiotherapy can be avoided in radically resected WHO grade I meningiomas, but can be proposed in cases of incomplete resection, for example in high-risk areas such as the cavernous sinus, or if subsequent salvage total resection is not possible, with a dose of approximately 50 Gy [2]. In grade II meningiomas the role of adjuvant radiotherapy is still controversial, but it can be considered in cases of incomplete resection. Grade III meningiomas are associated with higher risk of recurrence after resection, so postoperative high-dose radiotherapy is the standard of care and is correlated with improved local control [5]. In grade III meningiomas EBRT is associated with a 5-year PFS benefit of 15–80% in the adjuvant setting, but no benefit has been reported in recurrent disease [6, 7]. In grade II–III meningiomas the dose of radiotherapy should be 54–60 Gy with daily fractions over 5–6 weeks [8]. The co-operative group trial NRG/RTOG 0539 (NCT00895622) has prospectively tested the role of adjuvant EBRT with the primary end point of 3-year PFS [8-10]. The patients enrolled were divided into three

classes of risk based on tumor WHO grading and residual disease. The low-risk patients, including grade I meningioma with gross total resection (Simpson 1–3) or subtotal resection (grade 4–5), have been followed with observation only, with a preliminary RFS of 86%. Recurrence was higher in patients with subtotal resection (40%) compared with total resection (8.6% at 5 years) [9]. These data confirm that radiotherapy for gross totally resected grade I meningiomas can be avoided. Intermediate-risk patients included those with recurrent grade I or newly diagnosed gross totally resected grade II meningiomas. These patients were treated with salvage radiotherapy or adjuvant EBRT at the dose of 54 Gy, respectively. The radiation treatment was associated with a 3-year actuarial local failure rate of 4.1% and a 3-year overall survival rate of 96%, with no grade 3 toxicities [10]. Based on this benefit the use of EBRT is recommended in recurrent grade I meningiomas. The category of high-risk patients included those with newly diagnosed or recurrent grade III meningioma of any resection extent, recurrent grade II tumor of any resection extent, or newly diagnosed subtotally resected grade II meningioma. The treatment consisted of intensity-modulated radiotherapy (IMRT) with a simultaneous integrated boost technique (60 Gy high dose and 54 Gy low dose in 30 fractions). The treatment with IMRT (60 Gy/30) was associated with a 3-year PFS of 58.8%, with acute and late adverse events limited to grades 1–3, but with a single grade 5 event (necrosis-related event) [8]. These results support the use of postoperative IMRT for high-risk meningioma. In resected grade II meningiomas the prospective randomized trial (ROAM/EORTC-1308; ISRCTN71502099) is comparing the use of radiotherapy versus active monitoring after resection [11]. Brachytherapy with radioactive 125I seeds is no longer used in meningiomas [12]. For grade II meningiomas adjuvant radiotherapy still has an unclear role, but SRS could be employed after gross total resection as an alternative to observation – in particular for lesions in eloquent areas, after subtotal or partial resection, or for recurrent disease to achieve local control – while the role of EBRT is more controversial [1]. Some studies recommend EBRT irrespective of resection extent, especially when surgery cannot be radical [5, 13]. Conversely, other studies did not reveal a survival benefit for adjuvant EBRT [14, 15].

CONCLUSION

Meningiomas account for 25-30% of intracranial neoplasms. Atypical" meningiomas (WHO grade II) are tumors with histological and clinical characteristics on the borderline between benign and malignant meningiomas.

Surgery followed by postoperative radiotherapy reduces the incidence of local recurrence in atypical meningiomas, compared with surgery alone.

REFERENCES

1. Goldbrunner, R., Minniti, G., Preusser, M., Jenkinson, M. D., Sallabanda, K., Houdart, E., ... & Weller, M. (2016). EANO guidelines for the diagnosis and treatment of meningiomas. *The Lancet Oncology*, *17*(9), e383-e391.
2. Rogers, L., Barani, I., Chamberlain, M., Kaley, T. J., McDermott, M., Raizer, J., ... & Vogelbaum, M. A. (2015). Meningiomas: knowledge base, treatment outcomes, and uncertainties. A RANO review. *Journal of neurosurgery*, *122*(1), 4-23.
3. Kirkpatrick, J. P., Soltys, S. G., Lo, S. S., Beal, K., Shrieve, D. C., & Brown, P. D. (2017). The radiosurgery fractionation quandary: single fraction or hypofractionation?. *Neuro-oncology*, *19*(suppl_2), ii38-ii49.
4. El-Khatib, M., El Majdoub, F., Hoevels, M., Kocher, M., Müller, R. P., Steiger, H. J., ... & Maarouf, M. (2011). Stereotactic LINAC radiosurgery for incompletely resected or recurrent atypical and anaplastic meningiomas. *Acta neurochirurgica*, *153*, 1761-1767.
5. Hug, E. B., DeVries, A., Thornton, A. F., Munzenrider, J. E., Pardo, F. S., Hedley-Whyte, E. T., ... & Ojemann, R. (2000). Management of atypical and malignant meningiomas: role of high-dose, 3D-conformal radiation therapy. *Journal of neuro-oncology*, *48*, 151-160.
6. Fatima, N., Meola, A., Ding, V. Y., Pollom, E., Soltys, S. G., Chuang, C. F., ... & Chang, S. D. (2021). The Stanford stereotactic radiosurgery experience on 7000 patients over 2 decades (1999–2018): looking far beyond the scalpel. *Journal of Neurosurgery*, *135*(6), 1725-1741. doi:10.3171/2020.9.JNS201484
7. Dziuk, T. W., Woo, S., Butler, E. B., Thornby, J., Grossman, R., Dennis, W. S., ... & Chiu, J. K. (1998). Malignant meningioma: an indication for initial aggressive surgery and adjuvant radiotherapy. *Journal of neuro-oncology*, *37*, 177-188.
8. Rogers, C. L., Won, M., Vogelbaum, M. A., Perry, A., Ashby, L. S., Modi, J. M., ... & Mehta, M. P. (2020). High-risk meningioma: initial outcomes from NRG Oncology/RTOG 0539. *International Journal of Radiation Oncology* Biology* Physics*, *106*(4), 790-799.
9. Rogers, L., Zhang, P., Vogelbaum, M. A., Perry, A., Ashby, L., Modi, J., ... & Mehta, M. P. (2016). Low-risk meningioma: initial outcomes from NRG oncology/RTOG 0539. *International Journal of Radiation Oncology, Biology, Physics*, *96*(5), 939-940.
10. Rogers, L., Zhang, P., Vogelbaum, M. A., Perry, A., Ashby, L. S., Modi, J. M., ... & Mehta, M. P. (2017). Intermediate-risk meningioma: initial outcomes from NRG Oncology RTOG 0539. *Journal of neurosurgery*, *129*(1), 35-47.

11. Jenkinson, M. D., Weber, D. C., Haylock, B. J., Mallucci, C. L., Zakaria, R., & Javadpour, M. (2014). Radiotherapy versus observation following surgical resection of atypical meningioma (the ROAM trial). *Neuro-oncology*, *16*(11), 1560-1561.
12. Walcott, B. P., Nahed, B. V., Brastianos, P. K., & Loeffler, J. S. (2013). Radiation treatment for WHO grade II and III meningiomas. *Frontiers in oncology*, *3*, 227.
13. Hoffman, S., Propp, J. M., & McCarthy, B. J. (2006). Temporal trends in incidence of primary brain tumors in the United States, 1985–1999. *Neuro Oncol*, 8, 27–27.
14. Mair, R., Morris, K., Scott, I., & Carroll, T. A. (2011). Radiotherapy for atypical meningiomas. *J Neurosurg*, *115*(4), 811–819.
15. Stessin, A. M., Schwartz, A., Judanin, G., Pannullo, S. C., Boockvar, J. A., Schwartz, T. H., ... & Wernicke, A. G. (2012). Does adjuvant external-beam radiotherapy improve outcomes for nonbenign meningiomas? A Surveillance, Epidemiology, and End Results (SEER)–based analysis. *Journal of neurosurgery*, *117*(4), 669-675.