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Case Report

# Overcoming Adversity: Triumph in Managing Recurrent Grade 1 Parasagittal Meningioma Metastasized to the Lung with Surgical Precision and Radiosurgical Resolution. Case Report

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## Abstract

Meningiomas stand as the predominant intracranial tumors, with surgical excision being the gold standard treatment. For inoperable or recurrent cases, radiosurgery emerges as a viable option. The amalgamation of surgical and radiosurgical approaches is gaining traction in treatment paradigms. While extracranial metastasis in benign meningiomas is exceedingly rare, we present the case of a 62-year-old woman manifesting multiple lung masses five years post-complete resection of a benign parasagittal meningioma. Subsequent wedge lung excision unveiled a surprising diagnosis of meningioma. Six months thereafter, magnetic resonance imaging of the brain unveiled two small recurrent parasagittal meningiomas, promptly addressed via Cyberknife radiosurgery with a single fraction of 14 Gy. Astonishingly, complete tumor disappearance was observed at the 12-month follow-up. This report underscores a dual rarity-benign meningioma metastasis and complete tumor regression post-radiosurgery at the 12-month mark.

**Keywords:** Triumph; Parasagittal Meningioma; Lung; Radiosurgical

## Introduction

Meningioma is the most frequent primary tumor of the central nervous system, accounting for more than 30% of all intracranial tumors, with an occurrence rate of about 5 per 100,000 [1-3]. It is found in a parasagittal position in the brain in 20.8% of cases [4]. Median age at diagnosis is 65 years, and this tumor is more frequent in women than in men (female:male ratio of 2:1) [5]. Meningiomas are a group of neoplasms derived from the meningothelial cells of the arachnoid layer [6].

According to the 2016 World Health Organization (WHO) classification, meningioma ranges from benign (grade I) to aggressive tumors with a higher recurrence rate (grade II, atypical; grade III, anaplastic); this classification is most principally on mitotic activity, the presence or absence of brain invasion, and histological/morphological patterns and findings [7]. Even after complete resection, the local recurrence rate may be up to 39% [8].

Meningioma generally has a favorable prognosis, with a high potential for curative treatment and a five-year survival of 91.3% [9]. High meningioma grade and incomplete resection are the principal factors associated with recurrence [10].

Extracranial metastasis is rare, with a reported incidence of 0.1% [11]. A higher risk of metastasis is associated with prior

craniotomy, venous sinus invasion, local recurrence, and WHO grade III meningioma. Metastases occur most frequently in the lungs, followed by the liver, lymph nodes, and bone [12]. However, the metastasis of benign meningioma is extraordinarily rare, and its occurrence has yet to be determined. Most metastatic lesions are discovered after surgical interventions, consistent with a mechanism of metastasis based on iatrogenic seeding [13].

We describe here the recurrence of a parasagittal benign metastatic meningioma not invading the superior sagittal sinus, with multiple pulmonary metastases, detected five years after total resection and treated by radiosurgery. We also present a review of the literature on this topic.

## Case Presentation

A 62-year-old right-handed female presented at the emergency room with seizure and intracranial hypertension syndrome. Radiological assessment revealed a prerolandic convexity tumor on the right side, causing a mass effect and midline shift. (Figure 1). The patient underwent complete surgical excision of the tumor (simpson 1) (Figure 2). Microscopy revealed a proliferation coefficient of less than 3% (ki67). The radiological assessment after one year showed no recurrence.

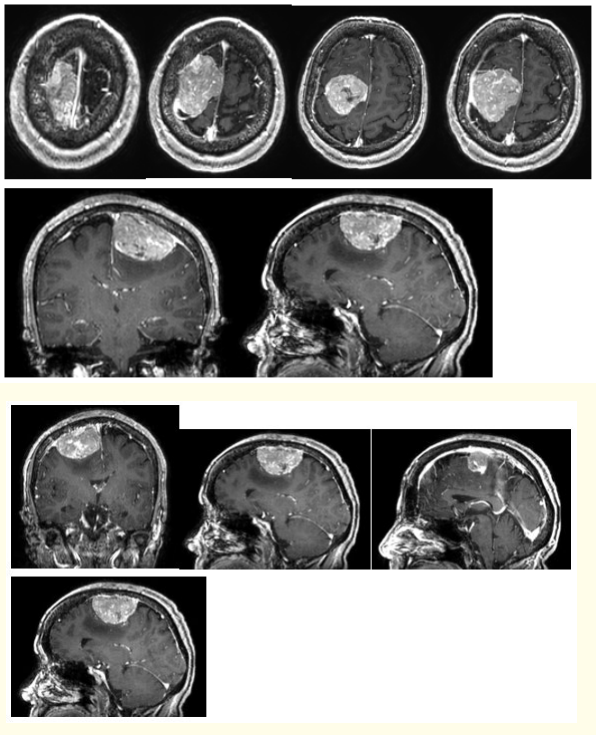

**Figure 1:** Presurgical brain MRI demonstrating the presence of parasagittal meningiomas.

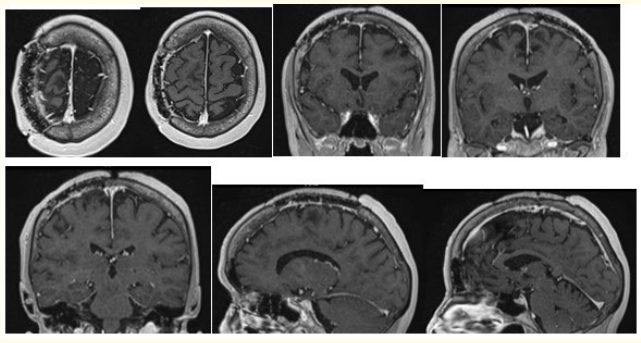

**Figure 2:** Postsurgical control MRI demonstrating complete excision.

Five years later, during assessment for a cough, two pulmonary nodules were discovered in the right lung on a chest CT scan (Figure 3). These findings led to a suspicion of metastasis. No potential primary tumor sites were identified on the PET scan. The patient underwent a wedge resection of these right lung nodules. Microscopy results were identical to those for the grade I meningioma previously removed by surgery.

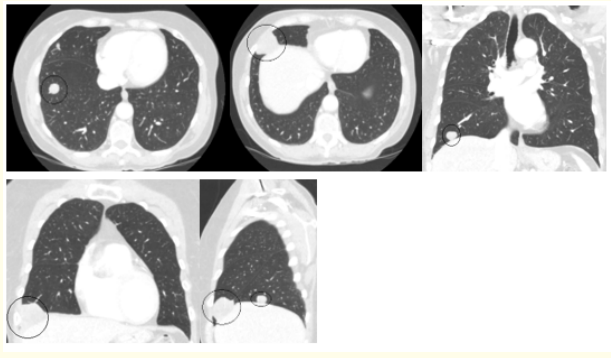

**Figure 3:** CHEST CT SCAN.

Six months after the wedge resection, chest CT scan revealed new paracardiac and left upper lobar nodules of less than 1 cm in diameter (Figure 4). The patient underwent a wedge resection, and microscopy results were identical to those for the previous wedge resection.

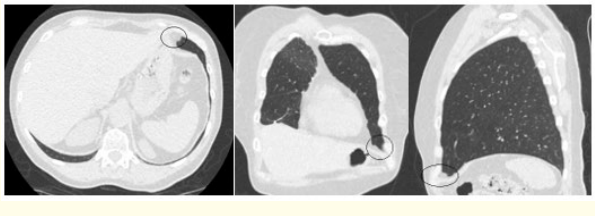

**Figure 4**

Brain MRI revealed two small parasagittal convexity meningiomas (Figure 5). These intracranial meningiomas were considered to be recurrences and were treated by Cyberknife radiosurgery with 14 Gy delivered as a single fraction (Table 1). The complete disappearance of the tumors was observed at the 12-month follow-up visit (Figure 6). Chest CT-scan was normal at this follow-up visit.

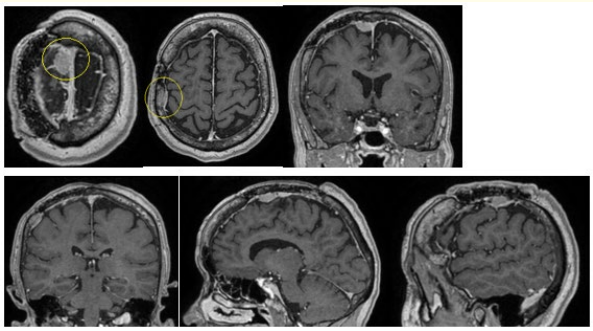

**Figure 5:** MRI before SRS.

| **Prescription isodose** | **69.0%** |
|---|---|
| Fractionation | 1 |
| Prescription dose (prescribed plan dose) | 14.00 Gy |
| Coverage | 98% |
| Selectivity index | 84.55% |
| Gradient index | 3.80 |
| Conformity index | 1.16 |
| Paddick conformity index | 0.83 |

**Table 1:** Dosimetry parameters.

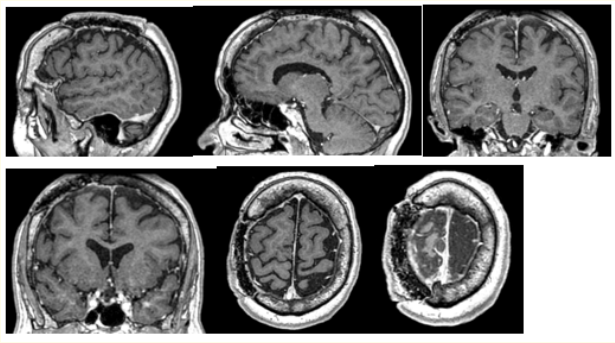

**Figure 6:** MRI 12 months post SRS.

## Discussion

Most meningiomas follow a relatively benign course. However, a subgroup of lesions may display more aggressive features, including local invasion and distant metastases [13-16], and the small subset of meningioma patients bearing such tumors can be challenging to manage.

Meningioma recurrence rates range from 0% to 22.5% at five years, with a mean time to recurrence of 26.2 months for WHO grade I meningiomas [17]. The risk factors most strongly associated with recurrence are subtotal resection, being male or young, a low apparent diffusion coefficient (ADC) on preoperative MRI, no calcification, and severe peritumoral edema [18,19].

Extracranial metastases of meningioma are extremely rare, occurring in less than 1% of patients diagnosed with meningioma; they are mostly detected in the lungs [12]. Such recurrences are more frequent in atypical (5%) and anaplastic (30%) meningiomas [20].

The time from initial diagnosis to the diagnosis of metastatic spread is highly variable, and appears to be unpredictable, ranging from concomitant metastases or metastases revealing the primary tumor to the discovery of metastatic spread more than 30 years after the primary tumor [21]. Metastases of low-grade tumors have also been observed. Prior craniotomy, venous sinus invasion, and local recurrence have also been reported to be associated with metastatic disease [22-24].

The choice of treatment depends on multiple factors, including tumor location, volume, and the techniques available.

Grade I meningiomas are usually treated by surgery, when possible, or by radiosurgery alone. Adjuvant radiotherapy is required only for growing remnants [25,32].

Surgical excision leads to removal of the tumor and the establishment of a histological diagnosis. Depending on tumor location and the degree to which surrounding structures and the brain parenchyma are invaded, complete resection can be achieved in <50% of patients. Postoperative Simpson grading is based on the surgeon's expert opinion. It rates removal from grade 1 (complete) to 5 (simple biopsy), and predicts symptomatic recurrence at 10 years at 10% to 100% [26].

## Radiosurgery

Stereotactic radiosurgery, or the 'Cyberknife' technique, is becoming increasing popular for the treatment of meningiomas, particularly for recurrent tumors, or tumors that cannot be completely resected. Radiation is delivered in one or several fractions and the five--year tumor control rate is similar to that for gross total resection. It has been used as a first-line treatment for benign meningioma, particularly for tumors located close to critical areas, and as an adjuvant treatment for residual or recurrent tumors [26,27]. It is safe and effective for the management of meningiomas, with only a few adverse effects [28-30], and high tumor control rates, ranging from 85% to 100% at five years [31,32].

In their meta-analysis, Marcello., *et al*. Found evidence for the efficacy of stereotactic radiosurgery (SRS) for the local control of WHO grade I meningioma, with a median progression-free survival of 89% at five years and 85% at 10 years [33].

Kondziolka and coworkers reported a series of 125 patients with convexity meningiomas treated with a single session of SRS, in which tumor control rates were 92% for first-line radiosurgery and 97% for adjuvant radiosurgery. The overall morbidity rate was 9.6%, with 5% of patients developing edema or adverse effects of radiation [34].

## Conclusion

SRS is an effective alternative treatment for recurrent meningioma. The metastasis of benign mengioma is rare but possible, and this should be borne in mind during follow-up, depending on the symptoms observed.

## Bibliography

1. Kodama K., *et al.* "Primary and metastatic pulmonary meningioma". *Cancer* 67.5 (1991): 1412-1417.
2. Ostrom QT., *et al.* "CBTRUS Statistical Report: Primary Brain and Central Nervous System Tumors Diagnosed in the United States in 2008-2012". *Neuro-Oncology* 17. 4 (2005): iv1-iv62.
3. Zouaoui S., *et al.* "Descriptive epidemiology of 13,038 newly diagnosed and histologically confirmed meningiomas in France: 2006-2010. *Neurochirurgie* 64.1 (2018): 15-21.
4. Yamashita J., *et al.* "Recurrence of intracranial meningiomas, with special reference to radiotherapy". *Surgical Neurology* 14.1 (1980): 33-40.
5. Dolecek TA., *et al.* "CBTRUS Statistical Report: Primary Brain and Central Nervous System Tumors Diagnosed in the United States in 2005-2009". *Neuro-Oncology* 14.5 (2012): v1-v49.
6. Louis DN., *et al.* "The 2016 World Health Organization Classification of Tumors of the Central Nervous System: a summary". *Acta Neuropathology* 131.6 (2016A): 803-820.
7. WHO Classification of Tumors of the Nervous System". *Journal of Neuropathology and Experimental Neurology* (2021).
8. Rogers L., *et al.* "Meningiomas: knowledge base, treatment outcomes, and uncertainties. A RANO review". *Journal of Neurosurgery* 122.1 (2015): 4-23.
9. Mahaley MS., *et al.* "National survey of patterns of care for brain-tumor patients". *Journal of Neurosurgery* 71.6 (1989): 826-836.
10. Ayerbe J., *et al.* "Risk factors predicting recurrence in patients operated on for intracranial meningioma. A multivariate analysis". *Acta Neurochirurgica (Wien)* 141.9 (1999): 921-932.
11. Pasquier B., *et al.* "Papillary meningioma. Clinicopathologic study of seven cases and review of the literature". *Cancer* 58.2 (1986): 299-305.
12. Kessler RA., *et al.* "Metastatic Atypical and Anaplastic Meningioma: A Case Series and Review of the Literature". *World Neurosurgery* 101 (2017): 47-56.
13. Surov A., *et al.* "Distant metastases in meningioma: an underestimated problem". *Journal of Neuro-Oncology* 112.3 (2013): 323-327.
14. Shin MS., *et al.* "Extensive pulmonary metastasis of an intracranial meningioma with repeated recurrence: radiographic and pathologic features". *Southern Medical Journal* 89.3 (1996): 313-318.
15. Palmer JD., *et al.* "Extracranial osseous metastases from intracranial meningioma". *British Journal of Neurosurgery* 8.2 (1994): 215-218.
16. Ferguson JM and Flinn J. "Intracranial meningioma with hepatic metastases and hypoglycaemia treated by selective hepatic arterial chemo-embolization". *Australasian Radiology* 39.1 (1995): 97-99.

17. Hwang WL., *et al.* "Imaging and extent of surgical resection predict risk of meningioma recurrence better than WHO histopathological grade". *Neuro-Oncology* 18.6 (2016): 863-872.

18. Backer-Grøndahl T., *et al.* "The histopathological spectrum of human meningiomas". *International Journal of Clinical and Experimental Pathology* 5.3 (2012): 231-242.

19. Koenig MA., *et al.* "Rhabdoid meningioma occurring in an unrelated resection cavity with leptomeningeal carcinomatosis. Case report". *Journal of Neurosurgery* 102.2 (2015): 371-375.

20. Enam SA., *et al.* "Metastasis in meningioma". *Acta Neurochirurgica (Wien)* 138.10 (1996): 1172-1177.

21. Forest F., *et al.* "Metastatic meningiomas: an unusual clinical and pathological diagnosis with highly variable outcome". *Journal of Neuro-Oncology* 120.2 (2014): 411-421.

22. Adlakha A., *et al.* "Meningioma metastatic to the lung". *Mayo Clinic Proceedings* 74.11 (1999): 1129-1133.

23. Frydrychowicz C., *et al.* "Two cases of atypical meningioma with pulmonary metastases: a comparative cytogenetic analysis of chromosomes 1p and 22 and a review of the literature". *Neuropathology* 35.2 (2015): 175-183.

24. Teague SD and Conces DJ. "Metastatic meningioma to the lungs". *Journal of Thoracic Imaging* 20.1 (2005): 58-60.

25. Noël G., *et al.* "Role of radiotherapy in the treatment of cerebral meningiomas". *Cancer/Radiothérapie* 5.3 (2001): 217-236.

26. Simpson D. "The recurrence of intracranial meningiomas after surgical treatment". *Journal of Neurology, Neurosurgery and Psychiatry* 20.1 (1957): 22-39.

27. Minniti G., *et al.* "Radiotherapy and radiosurgery for benign skull base meningiomas". *Radiation Oncology* 4 (2009): 42.

28. Lee JYK., *et al.* "Stereotactic radiosurgery providing long-term tumor control of cavernous sinus meningiomas". *Journal of Neurosurgery* 97.1 (2002): 65-72.

29. Bunevicius A., *et al.* "Stereotactic Radiosurgery for Perioptic Meningiomas: An International, Multicenter Study". *Neurosurgery* 88.4 (2021): 828-837.

30. Bloch O., *et al.* "Stereotactic radiosurgery for benign meningiomas". *Journal of Neuro-Oncology* 107.1 (2012): 13-20.

31. Starke RM., *et al.* "Gamma Knife radiosurgery of large skull base meningiomas". *Journal of Neurosurgery* 122.2 (2015): 363-372.

32. Patibandla MR., *et al.* "Stereotactic Radiosurgery of Central Skull Base Meningiomas-Volumetric Evaluation and Long-Term Outcomes". *World Neurosurgery* 108 (2017): 176-184.

33. Stereotactic Radiosurgery for Intracranial Noncavernous Sinus Benign Meningioma: International Stereotactic Radiosurgery Society Systematic Review, Meta-Analysis and Practice Guideline". *Neurosurgery* (2021).

34. Kondziolka D., *et al.* "Stereotactic radiosurgery for convexity meningiomas". *Journal of Neurosurgery* 111.3 (2009): 458-463.