



Review article

# Is simultaneous occurrence of meningioma and glioblastoma a mere coincidence?

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## Abstract

### Background

It is extremely unusual for multiple tumors to arise from different cell types and occur at the same time inside the brain. It is still unknown whether or not the coexistence of meningioma and glioblastoma is connected in any way or if their simultaneous appearance is merely a coincidence.

### Objective

We conduct a comprehensive literature review on cases of concurrent meningioma and glioblastoma occurrence to elucidate the underlying concepts that may constitute this coexistence.

### Methods

We searched for articles on the topic of glioblastoma coexisting with meningioma in Google Scholar, PubMed, and Scopus. First, the initial literature searches were conducted for study selection and the data collection processes. After evaluating the title and abstract, the papers were selected.

### Results

We analyzed 21 studies describing 23 patients who had both glioblastoma and meningioma. There were ten male patients (47.6 %) and thirteen female patients (61.9 %). The mean age of patients at diagnosis was 61 years old (the range 30 to 86). In 17 cases, both tumors were in the same hemisphere (80.9 %). In 5 cases, they were in the other hemisphere (23.8 %), and in one case, the glioblastoma was in the left hemisphere and the olfactory meningioma was in the right hemisphere (23.8 %). In 5 cases, they were in the other hemisphere (23.8 %), and in one case, the glioblastoma was in the left hemisphere and the olfactory meningioma was in the anterior cranial fossa. In 61.9 % of cases, headache was the predominant symptom.

### Conclusion

Understanding the unique challenges posed by the coexistence of glioblastoma and meningioma is crucial for developing effective treatment strategies. Further investigation into the underlying molecular mechanisms and genetic factors involved in this rare occurrence could pave the way for personalized therapies tailored to each patient's specific needs.

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## Introduction

Glioblastoma is recognized as the most common and malignantly aggressive primary brain tumor that arises from glial cells in adults. On the other hand, meningiomas are tumors that form in the arachnoid cap cells that line the brain and spinal cord and are usually benign. Despite their typically slow growth rate, meningiomas have been shown to become more aggressive in some patients over time [3]. The presence of these two types of tumors at the same time poses special challenges for doctors. Despite developments in neuroimaging and pathological analysis, definitive diagnoses are often made only after surgery, making preoperative identification of the coexistence of these tumors a significant challenge [1].

Examining this case series sheds light on a rare but real phenomenon: the co-occurrence of a meningioma and a glioblastoma in patients with no prior history of malignancy. These rare occurrences demonstrate the importance of further research into the normal development and behavior of these concurrent malignancies. Some theories propose that one tumor may promote the growth of its counterpart through growth factor secretion [11], while others suggest that it is merely a coincidence. Due to the small number of reported cases, the timeline of tumor development and the interaction between individual tumors remain unclear.

In order to shed light on this phenomenon and provide a thorough understanding of its underlying mechanisms, this literature review seeks to precisely study and synthesize the existing literature concerning the simultaneous coexistence of glioblastoma and meningioma. This study provides some illumination on the clinical implications and therapy options for patients diagnosed with both glioblastoma and meningioma by analyzing a variety of case studies and experimental findings.

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## Section snippets

### Methods

To conduct this literature review, we selected papers that addressed the topic of glioblastoma and meningioma coexistence. The search was conducted using electronic databases such as PubMed, Google Scholar, and Scopus. Coexistence, simultaneous occurrence, intracranial collision tumor, glioblastoma, meningioma, and collision tumor were the key words in our search.

The selection criteria for the articles were based on the incidence of both glioblastoma and meningioma simultaneously. Only 21...

### Results

According to the data given, there is a total of 23 cases discussed where patients simultaneously presented with meningioma and glioblastoma. These patients' ages at diagnosis range from 30 to 86. Females make up the vast majority of the patients (61.9 %), with only 10 males (47.6 %) among them. Glioblastoma was most frequently found in the frontal and parietal regions (61.9 %). The most common location for meningiomas was the frontal region of the brain (52.3 %). In most instances (80.9 %),...

## Discussion

The concomitant occurrence of glioblastoma and meningioma in the central nervous system is rare and intriguing, warranting additional study. Their underlying pathophysiology and growth dynamics are yet to be fully understood. However, based on the state of current scientific knowledge, several hypotheses and theories have been proposed.

According to the monoclonal origin theory, both glioblastoma and meningioma could develop from a single progenitor cell with the potential to give rise to...

## Conclusion

Glioblastoma and meningioma occurring simultaneously in the same patient are rare occurrences, with only a small number of cases described in the medical literature. Mechanisms for the co-occurrence of these two distinct tumor types remain unclear but likely involve intricate changes in both genes and the microenvironment. The most common method of treatment is surgical excision. Adjuvant therapies, such as radiotherapy and chemotherapy, slow tumor growth and reduce the likelihood of a...

## Limitation

The current review is limited by its reliance on case reports in the literature, which may be biased toward the reporting of exceptional cases. Additionally, most of them don't have any sort of follow-up....

## Source of support

None....

## CRediT authorship contribution statement

**Oday Atallah:** Writing – review & editing, Writing – original draft, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Bipin Chaurasia:** Writing – review & editing, Visualization, Validation, Supervision, Software, Resources, Project administration. **Alfredo Conti:** Visualization, Validation, Supervision. **Wireko Andrew Awuah:** Writing – original draft, Supervision, Software, Resources, Formal analysis. **Yasser F. Almealawy:**...

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