Case Report

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# Glioblastoma simulating an arteriovenous malformation: a case report

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**Introduction and importance:** Glioblastoma is the most common primary malignant brain tumor in adults. It is enhanced by the abnormal proliferation of central nervous system cells called astrocytes. Microvascular endothelial proliferation is one of the criteria for a histological diagnosis. Hypervascular glioblastoma simulating an arteriovenous malformation is an involuntary manifestation and constitutes a rare entity.

**Case presentation:** The authors report a case of a 44-year-old patient with no history followed. Symptoms began 6 months ago with the gradual onset of headaches without vomiting or seizures associated with a drop in normal visual acuity without neurological deficit. Cerebral imaging including cerebral angiography concluding with a right parieto-occipital cerebral process probably associated with an arteriovenous malformation.

**Clinical discussion:** The management was surgical by biopsy after a right parieto-occipital bone flap concluding in glioblastoma. The patient needs chemotherapy and radiotherapy sessions with good clinical evolution.

**Conclusion:** The coexistence of an arteriovenous malformation and glioblastoma remains an association whose pathophysiology still remains to be explored.

**Keywords:** arteriovenous malformation, case report, glioblastoma, hypervascularization

## Introduction

The association of glioblastoma and arteriovenous malformation is an exceptional entity although described in the literature[1]. Several hypotheses have been described, but its pathophysiology remains unclear. Very few brain tumors are induced by large arteriovenous shunts with vascular nests imitating real arteriovenous malformations[2]. And we discuss in this article the clinical, radiological, anatomopathologic, and therapeutic aspects.

## Case report

A 44-year-old female patient with no particular pathological history whose symptoms dated back 6 months with the progressive onset of headaches without vomiting or seizures associated with a decrease in bilateral visual acuity without neurological deficit. The ophthalmological examination noted bilateral light perception with bilateral papillary pallor. The cerebral CT scan with and without injection showed multiple right parieto-occipital serpiginous formations intensely enhanced after injection of PDC in relation to a right parieto-occipital process and perilesional edema responsible for subfalcorial engagement (Fig. 1). The cerebral MRI revealed a hypervascularized right intra-axial parieto-temporo-occipital tumor process of probable glial origin or an associated arteriovenous malformation (Fig. 2). The Cerebral angiography noting noted a right arteriovenous with nidus temporo-parietal, supplied by the right sylvian and drained by the superior longitudinal sinus (Fig. 3).

The biological assessment was normal. After discussion of the file, embolization was not retained.

### HIGHLIGHTS

- We report a case of a 44-year-old patient with no history followed at the CHU Ibn Rochd in Casablanca, Morocco. Symptoms began 6 months ago with the gradual onset of headaches without vomiting or seizures associated with a drop in normal visual acuity without neurological deficit.
- Cerebral imaging including cerebral angiography concluding with a right parieto-occipital cerebral process probably associated with an arteriovenous malformation.
- The management was surgical by biopsy after a right parieto-occipital bone flap concluding in glioblastoma. The patient needs chemotherapy and radiotherapy sessions with good clinical evolution.

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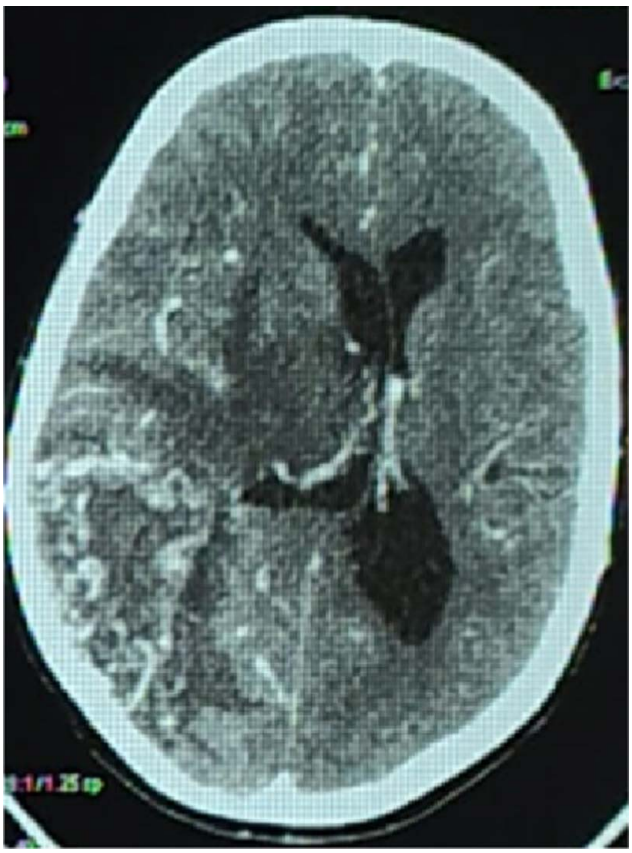

**Figure 1.** CT section of the parenchymal noting a right parieto-occipital tumor process and perilesional edema responsible for subfalcorial engagement.

The patient underwent a biopsy by right parieto-occipital flap. The intervention was performed by our professor under general anesthesia. A wide parieto-occipital craniotomy was performed after opening the dura mater and a small corticotomy. We found a hard reddish tumor that was very hemorrhagic, so hemostasis was difficult and we were satisfied with a simple biopsy. The patient remained stable through the operation in terms of dynamics and breathing.

The anatomopathological study noted an undifferentiated malignant tumor proliferation with vascular hyperplasia evoking a glioblastoma (Fig. 4).

The patient was referred to oncology for additional care with good clinical evolution after the chemotherapy and radiotherapy sessions.

The work has been reported in line with the Surgical Case Report (SCARE) Criteria[2].

## Discussion

Glioblastomas are the most common intracranial tumors, responsible for 9.1–15.4% of all primary central nervous system tumors[3]. Rarely hypervascularized, taking the appearance of an associated arteriovenous malformation following intratumoral vascular endothelial proliferation.[4] Strong angiogenesis allowing intratumoral arteriovenous connections due to vascular endothelial growth factor is the probable hypothesis put forward[5].

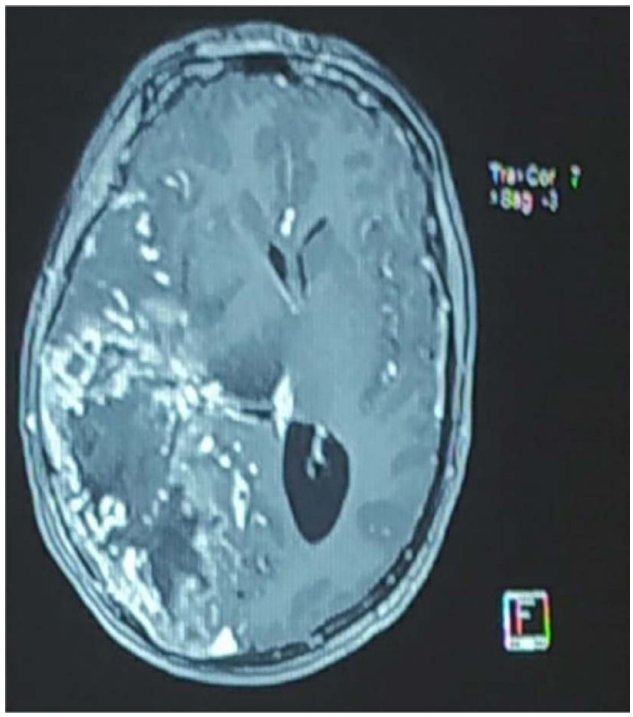

**Figure 2.** Brain MRI noting a hypervascularized right intra-axial parieto-temporo-occipital tumor process of probable glial origin or an associated arteriovenous malformation.

The arteriovenous malformations are traditionally considered congenital lesions, although some studies suggest de novo development of ischemic, inflammatory, hemodynamic, or even mechanical origin. If an arteriovenous malformation is diagnosed

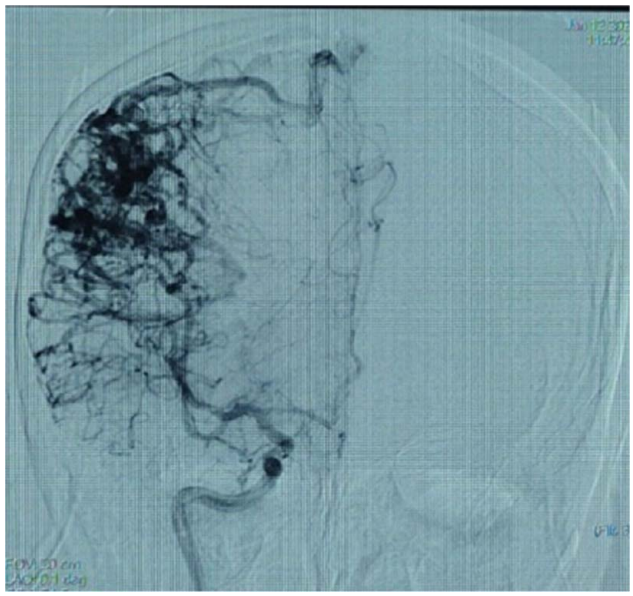

**Figure 3.** Cerebral angiography noting noted a right arteriovenous malformation with nidus temporo-parietal, supplied by the right sylvian and drained by the superior longitudinal sinus.

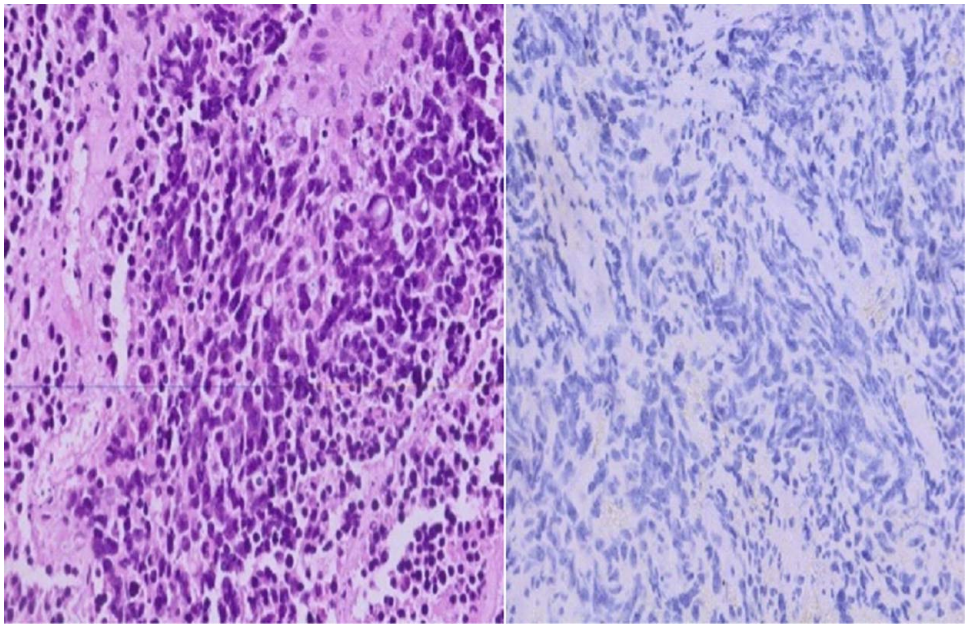

**Figure 4.** Anatomopathological study noting undifferentiated malignant tumor proliferation with vascular hyperplasia evoking a glioblastoma.

first, it may induce tumor growth[6]. Different hypotheses have been put forward according to the different studies, such as a separate association of fortuitous discovery, combined or sequential lesions, or even presenting as a single lesion[5,7,8].

The radiographic features that would differentiate the arteriovenous malformation from the tumor are frequently obscured, especially if there is the occurrence of acute or subacute hemorrhage that may show a mass effect sometimes with perilesional edema on the CT scan[7,8].

The cerebral angiography has made it possible to objectify an arteriovenous shunt in so many authors as in our case[8,9].

Among the 14 cases found in the literature, only one benefited from embolization, while the others benefited from total or subtotal resection with oncological follow-up as in our case. The histological examination concluded to a glioblastoma in the majority of the authors probably influencing the intratumor development of the arteriovenous connections thanks to the growth factor of the vascular endothelium[1,8–10].

The evolution was marked by a death in 3 out of 14 cases having benefited from resection with additional chemotherapy and radiotherapy, while it was good for the other cases as in our study[9–11].

## Conclusion

The coexistence of an arteriovenous malformation and glioblastoma remains an association whose pathophysiology still remains to be explored. Proangiogenic factors are most likely implicated in the existence of this entity. Surgical treatment is difficult because of the risk of massive intraoperative bleeding but has demonstrated its effectiveness. Preoperative endovascular embolization's would be an alternative method to control intraoperative blood loss.

## Ethical approval

Obtained.
Written informed consent for publication of their clinical details and/or clinical images was obtained from the patient.
Ethical approval has been exempted by our institution.

## Consent

Written informed consent was obtained from the parents for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

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## Conflicts of interest disclosure

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