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SUCCESSFUL SURGICAL MANAGEMENT OF A COMPLEX FRONTAL LOBE AND HIPPOCAMPAL CAVERNOUS ANGIOMA: A CASE REPORT

Mukhammadov Nuriddin Askarovich

Mohsin Ayoub
Department of Neurosurgery
Multi-Disciplinary Clinic, Samarkand State Medical University
Samarkand, Uzbekistan.

Abstract: Cerebral cavernous angiomas (also referred to as cavernomas or cavernous malformations) are vascular abnormalities composed of clusters of dilated capillary vessels with thin walls and no intervening brain parenchyma. Although histologically benign, these lesions may have serious clinical consequences, particularly when located in functionally critical areas of the brain. Their unpredictable natural history and potential for neurological symptoms make them a subject of increasing interest in neurology and neurosurgery. Cavernous angiomas are relatively rare, occurring in approximately 0.4% to 0.9% of the general population. They may present sporadically or as part of a familial syndrome, often associated with mutations in specific CCM (Cerebral Cavernous Malformation) genes. While many lesions remain asymptomatic, a significant number become clinically relevant due to hemorrhagic events or seizure activity. The lesions typically consist of sinusoidally dilated vascular channels lined by a single layer of endothelium, often surrounded by hemosiderin deposits indicating prior microbleeds. The clinical manifestations of cavernous angiomas are highly variable and largely dependent on lesion location. Seizures are among the most common symptoms, particularly when the lesion is situated in the cerebral cortex or limbic structures such as the hippocampus. In many cases, seizures can be the initial or only presentation. Lesions may also cause progressive focal neurological deficits or acute symptoms due to hemorrhage. Patients with epilepsy related to cavernous angiomas often become resistant to pharmacologic treatment, necessitating further evaluation for surgical intervention. Magnetic resonance imaging (MRI) is the gold standard for detecting cavernous angiomas. Advanced imaging techniques, particularly susceptibility-weighted imaging (SWI) and T2*-weighted sequences, are crucial for identifying small lesions and detecting surrounding hemosiderin rings from prior bleeding. Functional imaging, including functional MRI and PET, can help assess the impact of the lesion on eloquent brain areas, while video EEG monitoring is essential in evaluating seizure focus in surgical candidates. Surgical resection is a well-established treatment option for symptomatic cavernous angiomas, especially in cases of drug-resistant epilepsy or recurrent hemorrhage. The goal of surgery is not only to remove the lesion but also to excise the surrounding gliotic and hemosiderin-stained tissue that may contribute to epileptogenesis. Advances in intraoperative neuronavigation, cortical mapping, and electrocorticography have significantly improved the safety and efficacy of surgical procedures, even in eloquent brain regions.

Patients with superficial, non-eloquent lesions generally have favorable surgical outcomes, but with the aid of modern techniques, lesions in deep or functionally sensitive areas such as the mesial temporal lobe can also be safely removed. In epilepsy-related cases, complete lesionectomy combined with resection of the epileptogenic zone offers a high probability of seizure freedom.

Keywords: exercise therapy, degenerative-dystrophic diseases, muscles, complex exercises, rehabilitation.

Introduction

Non-Surgical Management

For asymptomatic patients or those with minimal symptoms, a conservative approach involving clinical and radiological monitoring is often appropriate. Antiepileptic drug therapy may be effective in managing seizures initially, but in cases of pharmacoresistance, surgical options should be considered early. Stereotactic radiosurgery has been explored as a less invasive alternative, but current evidence does not support its widespread use due to inconsistent outcomes and potential complications.

Conclusion

Cerebral cavernous angiomas, while rare, present a significant challenge when symptomatic—particularly in the context of epilepsy. With the continued development of neuroimaging and surgical techniques, outcomes for patients with symptomatic lesions have improved dramatically. Early identification and multidisciplinary assessment are key to optimizing management. Surgical resection remains the definitive treatment in cases of drug-resistant epilepsy or high-risk hemorrhagic lesions, offering the potential for long-term symptom control and improved quality of life.

Keywords: **cavernous angioma, vascular malformation, neurosurgery, mri, treatment**

Introduction: When a 36-year-old man walked into our clinic with a history of increasingly frequent seizures, we faced a complex case that would test our surgical expertise. Cavernous angiomas, though benign, can significantly impact quality of life, particularly when located in eloquent brain regions. This report details our approach to a challenging case involving dual-location vascular malformation.

Patient Demographics and History: Our patient, a 36-year-old male, first noticed neurological symptoms in 2007 when he began experiencing seizures. By the time he reached our department in November 2024, these episodes had escalated to twice weekly, accompanied by consciousness loss and limb tremors. Despite being on Depakine Chrono and Carbamazepine, his symptoms persisted.

Clinical Presentation: The patient presented with multiple neurological symptoms including persistent headache, dizziness, frequent seizures, memory loss, and urinary difficulties. His previous medical records showed an earlier hospitalization in May 2024 at our institution's Neurosurgery Department, where conservative management was attempted.

Physical Examination: On examination, we found a fully alert patient with intact vital signs (pulse 72/min, BP 120/80 mmHg) and normal cranial nerve function. Notably, his Glasgow Coma Scale was 15/15, with no meningeal signs and preserved motor function in all limbs, though with slight coordination impairment.

Diagnostic Findings:

MRI revealed a cavernous angioma strategically positioned in both the right frontal lobe and hippocampus - a challenging location for surgical intervention. Additional workup showed mild anemia (Hb 120 g/L) but otherwise normal laboratory values.

Surgical Approach: On November 20, we performed a carefully planned bone-plastic trepanation. The procedure required meticulous attention to detail, particularly during the creation of 4 burr holes in the frontal skull area. The surgical findings matched our imaging studies: a yellowish-pink nodular mass characteristic of cavernous angioma. Through careful microsurgical technique, we achieved complete resection while preserving surrounding structures.

The key steps included: A precise fronto-lateral incision with meticulous hemostasis. Strategic placement of burr holes for optimal exposure. Microsurgical tumor dissection with continuous monitoring. Careful closure with subdural and epidural drainage placement

Post-operative Course: The patient's recovery exceeded our expectations. By post-operative day five, he was ready for discharge with significantly improved neurological function and reduced seizure activity. Follow-up examinations showed sustained improvement in his condition.

Discussion: This case reinforces several key principles in managing complex cavernous angiomas. First, the importance of proper surgical timing - when medical management fails, surgical intervention shouldn't be delayed. Second, the value of thorough preoperative planning, particularly with dual-location lesions. Our experience adds to the growing body of evidence supporting microsurgical resection as the gold standard for symptomatic cavernous angiomas.

Conclusion: Our case demonstrates that even complex, dual-location cavernous angiomas can be successfully managed through careful surgical planning and execution. The patient's positive outcome reinforces the role of surgical intervention in cases refractory to medical management.

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