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Case Report

Paraventricular meningioma revealed by mental disorder

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Abstract

Background: Ventricular meningioma constitutes 2% of intracranial meningioma, representing a challenging disease for neurosurgeons. Although cognitive impairment is one of the major symptoms of ventricular tumors, few studies have reported the details of cognitive impairment before and after their surgical removal. The expected effects on cognitive function should also be considered when choosing a surgical approach.

Case Descriptions: We report the case of a large lateral ventricle meningioma revealed by cognitive dysfunction and moderate intellectual disability. The patient underwent subtotal resection of the tumor which had partial improvement in cognitive disorders. It is important to precisely assess neuropsychological function in patients with large brain tumors, and judicious preoperative plan, adequate knowledge of anatomy, and use of correct microsurgical techniques are fundamental in achieving complete resection of paraventricular meningioma with low morbidity.

Conclusion: Pre and postoperative precise neuropsychological examinations may identify the potential cognitive impairment and beneficial effects of surgery in patients with large lateral ventricle meningiomas.

Key Words: Meningioma, mental disorder, ventricle

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INTRODUCTION

Ventricular meningioma constitutes 2% of intracranial meningioma,[14] representing a challenging disease for neurosurgeons. As the tumors grow, however, they gradually elevate intracranial pressure and patients often present with visual field defects, limb weakness, and cognitive impairment such as memory disturbance and miscalculation.[12] Surgical resection is difficult without complications or new neurological morbidities. There is a high incidence of morbidity of approximately 42%.[2,3] Many approaches to the trigone have been described and the challenge is to choose the best to provide wide tumor exposure and early access to the vascular pedicle to allow complete tumor resection causing less additional lesion.[28]

Here, we report the case of a large lateral ventricle meningioma associated with cognitive dysfunction and intellectual disability. The patient underwent subtotal resection of the tumor with an improvement in cognitive disorders.

CASE REPORT

A 26-year-old women had moderate intellectual disability with cognitive disorders. She presented with increase

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intracranial hypertension and seizure, but without motor or sensitive disturbance. The fundus showed papillary edema. Computed tomography (CT) scan demonstrated an isodense tumor located in the right paraventricular at the occipitotemporal region [Figure 1]. The tumor was well rounded with contrast enhanced and perilesional edema on magnetic resonance imaging (MRI). It was attached to the right latera ventricular wall [Figure 2]. The patient underwent surgery with subtotal removal after a small corticectomy in the posterior-inferior temporal lobe without any navigation system. Tumor was rounded, but not encapsulated or hemorrhagic despite its vascularization by choroidal vessels and its attachment to the latera ventricular wall, which was opened. Resection with piecemeal removal was limited by two parameters. First, there was choroid plexus vascularization; second, the tumor was less limited anteriorly and partially infiltrating temporal lobe. The operative and postoperative courses were uneventful, and the patient's motor and visual functions were intact. A histopathological examination confirmed the diagnosis of fibroblastic meningioma. Neuropsychological tests were spotted 15 days and 4 months after the surgery. The results showed that all scores on Repeatable Battery for the Assessment of Neuropsychological Status (RBANS) significantly improved [Figure 3].

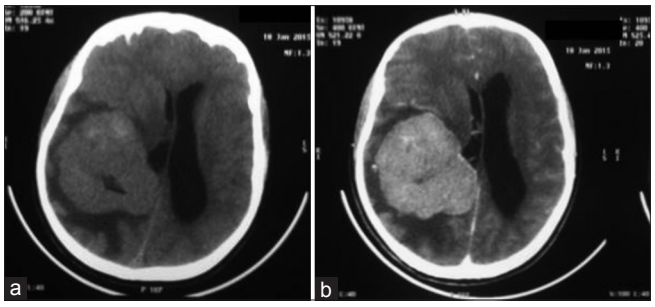

Figure 1: Computed tomography scan showing huge hypodense (a) and hyperdense (b) paraventricular tumor

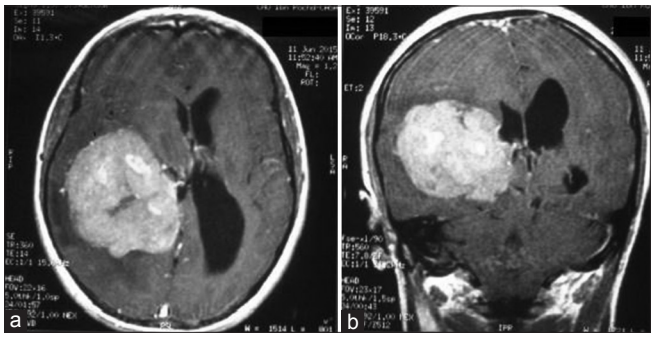

Figure 2: Cerebral magnetic resonance imaging after gadolinium in axial (a) and coronal (b) view showing meningioma attached to the ventricular wall

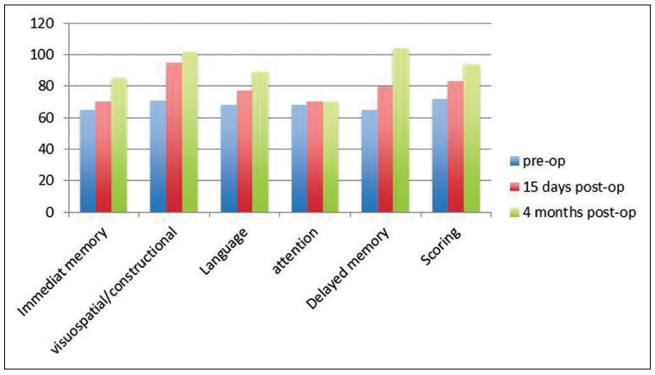

Figure 3: Results of the tests included in the RBANS before and after tumor removal

DISCUSSION

Meningiomas arising in the ventricular system without dural attachment are extremely rare, with an incidence of 0.5–3% (average 2%) among all intracranial meningiomas.[1] They also represent 9.8–14% of all ventricular tumors and 20% of all tumors inside the lateral ventricle.[8] The origin of lateral ventricle meningiomas is uncertain. However, they apparently originate from the stroma of the choroid plexus or from the remains of arachnoid cells within the choroid.[13,19] These cells are conducted together with the choroid plexus as the ventricular system invagination during the embryonic period.[4,16] Criscuolo and Symon has reported 10 cases of intraventricular meningiomas among 500 intracranial meningiomas, accounts for 2% of the total incidence rate.[22] The atrium is the most common location for intraventricular meningiomas in approximately 77.8% to 80%, followed by the fourth in 6.6% and 5.6% in the third ventricles.[5,21,26]

Cognitive impairment is well known as a major symptom of entlateral vricular tumors and may potentially be complicated after their surgical removal.[2,22] Detailed neuropsychological evaluation would be essential in these cases because of its serious impact on patients' quality of life. However, there are few reports that precisely denote cognitive function in patients with lateral ventricle tumors. According to previous studies, the prevalence of preoperative cognitive impairment and personality changes is estimated to be 10–20% in these patients.[10] However, this value may be much higher because Milligan and Meyer[20] reported that approximately half of the patients had these symptoms when cognitive function tests were precisely performed by medical neurologists. It is known that involvement of periventricular limbic structures or hydrocephalus is the cause of cognitive impairment. In this case, large perifocal edema and tumor volume were the main causes of cognitive impairment.

RBANS score was selected to identify and evaluate cognitive disorders before and after the surgery. The RBANS consists of 12 subtests and yields index scores for 5 traits, namely, attention (digit span, coding),

language (picture naming, semantic fluency), visuospatial/constructional abilities (figure copy, line orientation), immediate memory (list learning, story memory), and delayed memory (list recall, list recognition, story recall, figure recall). Scores can be normalized for age, sex, ethnicity, and level of education, with a score of 100 and a standard deviation of 15 for the index group.[15,24] Preoperative neuropsychological assessment is especially crucial in these patients because surgical approaches to the lateral ventricle may potentially cause permanent cognitive dysfunction through injury to delicate areas. Based on this case, cognitive impairment due to the effects of a tumor may be reversible.[12]

The optimal surgical approach for a paraventricular meningioma is still controversial. In general, there are three main surgical approaches to remove lateral ventricle tumors, namely the superior parietal, transcallosal, and middle temporal gyrus approaches.[11,18,20] The choice of surgical approach depends on patient and tumor factors as preoperative symptoms, tumor size and location, laterality and feeders, as well as on surgeon preference. In the present case, the authors have selected a transtemporal approach through the posterior-inferior temporal gyrus with a small corticectomy. This route gives the quickest access to the choroidal vessels. Superior parietal approach has been reported to carry a higher inherent risk of cognitive impairment.[9,24,25] In the presence of hydrocephalus or temporal horn entrapment, access and retraction is significantly facilitated.[3,7,17] However, there is high risk of injury to the inferior aspect of the optic radiation (causing contralateral quadrantopsy) and to the sensory language cortical center in the dominant hemisphere (causing Wernicke aphasia).[6,7,9,23] Surgical resection in these cases is difficult without adding new neurological deficits, with morbidity rate of up to 42% such as hemianopsia, epilepsy, and speech disturbance.[8] Functional MRI can be helpful to identify functional areas and to avoid postoperative complications, especially patients with mental or intellectual disability were more likely to have obvious IRM changes.[27]

In our opinion, the objective is not to obtain maximum tumor resection but extirpation with less surgical morbidity and minimal or no damage to surrounding brain tissue. The aim must be a good exposure of the lesion as well as an early visualization of the arterial pedicle. Occlusion of these vessels results in tumor hemostasis. Piecemeal removal is crucial for achieving resection of the tumor with minimum damage and for careful intraoperative hemostasis to ovoid intraventricular hemorrhage.

CONCLUSION

In conclusion, pre and postoperative precise neuropsychological examinations may identify the potential cognitive impairment and beneficial effects of surgery in patients with large lateral ventricle meningiomas. The cure of meningioma of this tumor can be achieved with appropriately selecting surgical route according to the anatomical features of the region, characteristics of the individual presentation such as size, location, growing patterns, and clinical preoperative deficits.

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Conflicts of interest
There are no conflicts of interest.

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