Sphenoid wing meningioma presenting as cognitive impairment

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Summary: Frontal meningioma may present solely with psychological symptoms that resemble dementia. We present the case of a 42-year-old man who initially was thought to have dementia, but he was eventually diagnosed with dementia caused by a sphenoid wing meningioma. Diagnosis of this illness is often delayed due to the insidious nature of the symptoms, which may be mistaken as symptoms of dementia. As cognitive impairment is complex and easily overlooked, it is important to accurately assess neuropsychological function in patients with large brain tumors.

Keywords: meningioma; cognitive impairment; dementia; India

1. Introduction
Meningiomas are the most common benign brain tumors, accounting for 13 to 26% of intracranial tumors. They are extra-axial tumors arising from arachnoid cap cells. They may occur where arachnoid cells are found between the brain and the skull, within ventricles, and along the spinal cord. These lesions can occur in people of any age but commonly present among middle-aged individuals. The three most common symptoms are headache, mental status changes, and paresis. Meningiomas that compress the frontal lobes are notoriously ‘silent’, and are thus, likely to be misdiagnosed or overlooked. The reported incidence is low because most meningiomas are asymptomatic.

Cognitive deficits are common in patients with brain tumors. Research from as early as the 1930s revealed that malignant tumors may sometimes lead to cognitive deficits, while other benign brain tumors are associated with changes in patients’ personality and mood. In 2000, Tucha and colleagues reported that more than 90% of patients with brain tumors displayed impairments in at least one area of cognition. The most common impairment was in the executive function domain (78%), while impairments of memory and attention were second most common (60%). Patients with brain tumors mostly commonly complain of headache, dizziness, and neurological deficits, so themore subtle cognitive deficits induced by tumors are often overlooked by clinicians.

Cognitive function can thus serve as an early indicator of disease progression and has prognostic significance that deserves the same amount of attention from clinicians as other neurological indicators. This case report presents the case of a sphenoid wing meningioma in a patient who presented with cognitive impairment. We also discussed related literature and highlight the importance of identifying subtle cognitive symptoms in the diagnosis of a brain tumor.

2. Case history
Mr. X. was a 42-year-old, highly educated, middle-class, urban male with an average build. He was a bank employee whose job was sorting cash. His employer brought him to our hospital's adult outpatient psychiatry department because he had a two-year history of irritability, frequent absenteeism, and a high rate of errors in his cash sorting tasks. Before deciding whether or not to dismiss him from his job, the bank authorities chose to review his circumstances, so he was sent to our hospital for a formal evaluation.

The patient had been employed at the bank for the past 18 years, and up until the past two years, he had been very punctual and reliable. Two years ago he was diagnosed with hypertension and was...
started on Amlodipine 5 mg. When we evaluated him, his hypertension was well managed; he was taking Amlodipine 10 mg per day, and his average blood pressure level was within normal limits. His employer reported that the patient made frequent, careless mistakes in his cash sorting tasks. His entailed sorting monetary notes of various denominations and putting them in bundles of 100 notes each. In the past he had carried out his work properly, but in recent two years he was either absent or late to work. And when at work, he improperly sorted the various denomination notes. For example, he would mix 1000 Indian rupee notes with 500 Indian rupee notes, or when bundling the notes, his stacks would contain only 99 instead of 100 notes. His mistakes were found when his bundles were inspected by his supervisor or checked by an electronic cash counter.

Initially, when these mistakes were discovered, his creditability was questioned. He underwent rigorous security checks, but he was always found to be innocent of any wrong doing. But when his daily stacks of bundles were checked, some bundles had extra notes, while others lacked them. Although he was found to have no malicious intent, his mistakes could not be ignored. He was given a medical leave of absence and requested to have an evaluation before returning to work. After one month he returned to work with a medical report indicating his blood count and kidney function tests were normal. However, he continued making mistakes. Whenever he was approached regarding these errors, he would simply deny having made them. He would behave as though nothing wrong had occurred. Over a period of time he became increasingly withdrawn. His interactions with family members decreased, and he became more aloof, though not reporting any sadness. His past history, premorbid personality, and family history appeared to be non-contributory. Also, he had no history of substance abuse. Thus, he was advised to undergo a psychiatric evaluation within a government hospital.

His mental status examination revealed decreased psychomotor activity but average personal hygiene. He was conscious of himself and his surroundings and was oriented to time, place, and person. His attention could be aroused, but his concentration was impaired. His affect was euthymic throughout the interview. His thinking showed concern for his job, and no perceptual abnormality was detected. His immediate, recent memory was impaired, but his remote memory was intact. He had an average level of intelligence with an adequate general fund of knowledge and average arithmetic ability. However, his abstract thinking and judgment were impaired. He had no insight about his symptoms. Higher mental function tests showed impaired verbal fluency and paired associate learning. He failed the Stroop and Trail B tests. In addition, his impairment in abstract thinking and problem solving was evident from the Wisconsin card sorting test results. Visuospatial impairment was evident as he was unable to recognize common objects such as the local currency coins, though he recognized all of the currency notes. He could not carry out rapid alternating movement and digit forward and backward tests. His MMSE score was 14/30.

Considering his history, mental status examination, and neurocognitive tests, a provisional diagnosis of Major Neurocognitive Disorder (dementia) was suggested, based on criteria from the Diagnostic and Statistical Manual of Mental Disorders, Fifth edition (DSM-5)[8], and a battery of further tests was ordered. His complete blood count, serum electrolytes, and renal and liver function tests were within normal limits. His ECG was normal, but his MRI scan showed a large left sphenoid wing hypertensive meningioma. Following the MRI report, we revised our diagnosis to Major Neurocognitive Disorder Due to Another Medical Condition (Cerebral Tumor) according to DSM-5 criteria. The diagnosis of dementia was made on the basis of clinical examinations, including a mental status examination, and detailed information from family members, friends, and employers.

The patient was then referred to the neurosurgery department for further management and the surgical removal of the tumor. He showed significant improvement following surgery and was able to successfully return to his work after three months of recovery. He was prescribed oral Sodium Valproate 1000 mg and Donepezil 10 mg per day. Now he does not make the mistakes he had made previously. Although, repeated higher mental function tests continue to show a mild cognitive impairment, he is able to perform his job well. His current MMSE score is 22/30. Because of his medical illness, his job position was changed to one with less responsibility which does not involve handling money. He currently is performing well in a revised but respected work position with satisfactory performance.

3. Discussion

Meningiomas occur at a rate of 7.8 per 100,000 per year, but only 25% are believed to be symptomatic; the other 75% are discovered incidentally. Radhakrishnan and colleagues followed 57 individuals with asymptomatic meningioma for 32 months. None of the individuals became symptomatic. Meningiomas are generally slow growing and their presentations are mainly due to the compression of nearby structures. Depression, memory deficit, and combativeness have been found to be the three most common signs or symptoms found among 30 inpatients with brain tumors.

Both anatomic and physiological perturbations in the brain are likely involved in the associations between cognitive symptoms and brain tumors. When meningioma involves the frontal lobes, symptoms of lassitude, apathy, psychomotor slowing, and impaired concentration may be historically indistinguishable from an affective episode. In this case, the patient’s
meningioma was near the sphenoid wing, impinging upon the frontal lobe, so cognitive symptoms were the presenting features. Our patient represents a typical illustration of ‘executive dysfunction syndrome’: he presented mainly with features of impaired reasoning, problem solving and judgment which led to impaired social and occupational functioning, which further led to significant humiliation for the patient and his family. Thus, individuals who present symptoms of dementia prior to 50 years of age should be carefully assessed before given a definitive diagnosis because primary intracranial tumors do not produce specific clinical manifestations that would lead to easy discovery.

Assessment of cognitive functioning in patients with brain tumors is becoming an increasingly important outcome measure in clinical trials. Comprehensive assessment of cognitive function can require a detailed, time-consuming battery of tests that can be tiring for some patients. Various neuropsychological tests given to our patient showed that performance on even short and relatively simple tests may be impaired in dementias due to another medical disorder. Whichever tests are chosen, the impact of repeated assessment must be understood, so that findings are not compromised. Our patient showed significant improvement in his MMSE score following surgery, suggesting that all of his cognitive symptoms were mainly due to meningioma. The reason we initially suspected a medical cause for his dementia was the early age of onset (less than 45 years), a significant intellectual impairment, memory loss and forgetfulness, difficulty handling money, making mistakes at work, denial, social withdrawal, and significant impairment in social and occupational functioning. It is very difficult to approach a patient with findings suggesting early dementia, but early recognition of symptoms help in early diagnosis and management.

Though little is known about cognitive function in patients suffering from this condition, Tucha and colleagues investigated cognition among elderly patients with falx cerebri meningioma and found significant improvement in various domains of cognition after surgery, as was seen in our patient. A common clinical feature of many patients with intracranial tumors is psychomotor slowing. This phenomenon is attributable, at least in part, to impaired information processing speed. Therefore, a simple objective task that measures some aspect of brain processing speed could be particularly useful in neuro-oncology. Thus, evaluation of these patients should not only focus on treatment, but should also examine specific cognitive functions and impairment associated with it. Even mild cognitive impairments may compromise an individual’s ability to carry out their work responsibilities or other activities, and neuropsychological rehabilitation is important for patients suffering from this condition.

4. Conclusion

In conclusion, cerebral meningiomas are likely to be misdiagnosed or overlooked. Patients with such tumors are often initially referred to psychiatrists. When a young person with no history of psychiatric illness develops a slow and progressive psychological change, organic causes should be considered. There are features that present in the early stages of psychological disorders that are indicative of a serious organic disease based on which neuroradiological investigation should be done. These features include no previous history of psychiatric disorder, the onset of cognitive symptoms before 50 years of age, and a slowly progressive psychological change, all of which increase the likelihood of a diagnosis of a silent brain tumor.

Conflict of interest statement
The authors report no conflict of interest related to this case report.

Informed consent
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蝶骨嵴脑膜瘤表现为认知功能障碍

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概述：额叶脑膜瘤可仅表现出类似痴呆的心理症状。我们报告一例42岁的男性。患者最初被认为患有痴呆，最终确诊为蝶骨嵴脑膜瘤所致的痴呆。蝶骨嵴脑膜瘤的症状隐匿，往往会延误诊断，会被误认为是痴呆的表现。由于认知障碍比较复杂而且容易被忽视，所以准确评估患有脑部巨大肿瘤患者的神经心理功能是非常重要的。

关键词：脑膜瘤；认知障碍；痴呆；印度
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