Magnetic Resonance Imaging of an Intraventricular Meningioma in a Nigerian Male

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ABSTRACT

Primary intraventricular meningiomas (IVM) are rare, and are even less seen in men. There are only very few reports in Nigerian medical literature and in our hospital, this report is the first. We present herewith a 35-year-old man with clinical suspicion of pituitary macroadenoma on account of headache and visual impairment. He had Magnetic Resonance Imaging (MRI) and histological diagnosis of intraventricular meningioma. This case highlights the value of presurgery MRI as well as the characteristic MRI features which could enable a noninvasive diagnosis. The patient had successful surgical removal and has been followed-up for 2 years.

Key words: Intraventricular; magnetic resonance imaging; meningioma

Introduction

Meningiomas are lobulated or spherical well defined solid tumors with mostly benign histologic features and they represent the most common extra cerebral primary tumor of the central nervous system (CNS).[1] In 1854, Shaw documented the first intraventricular meningioma (IVM) in the trigone of the lateral ventricle in a patient who had epilepsy and language disturbance.[2] Over twelve decades later came reports of cranial meningiomas from Nigeria[3-6] with incidence varying from 23.8-35%.[5,6] However, little is still known about the intraventricular subtype. Meningoendothelial cells in any location can give rise to meningioma but it is unusual in the cerebral ventricles, occurring in about 0.5-3% of cases.[7,8] In spite of this infrequent occurrence, the commonest intraventricular tumor is still a meningioma.[8] Its etiology is poorly understood but it has been associated with previous head irradiation, severe head injury, and genetically inherited condition like neurofibromatosis type 2. Magnetic resonance imaging (MRI) supersedes computerized tomography (CT) for presurgical evaluation, treatment plan, and for follow-up. Early MRI in malignant IVM also helps to rule out intracerebral and intraspinal tumor seedling.

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Case Report

A 35-year-old male farmer, was referred to our center on account of progressive visual loss 8 months prior to presentation and a 5 year history of frontal headaches. His visual symptoms began with blurring of vision and later, he could only see image outlines. There was associated eye pain and redness but no eye swelling. The headache was initially frontal then later became generalized, radiating to the back. He could not identify any aggravating nor relieving factors. There were no symptoms of raised intracranial pressure like seizures, loss of consciousness, vomiting, or memory impairment. The patient had neither previous head irradiation nor head trauma and there were no peripheral stigmata of a neurocutenous disorder. He also had no symptoms referable to the cardio-pulmonary system or gastrointestinal tract.

On general physical examination, patient was conscious, alert, and could move all limbs. He was afebrile, anicteric, and not pale. There were no abnormalities in other systems. However, visual examination revealed dilated pupils of about 4 mm which were poorly reactive to light. There was poor vision (hand motion) of the right eye, and no vision (no perception of light) in the left eye. The initial clinical diagnosis was pituitary macroadenoma with a differential

diagnosis of a suprasellar mass. Plain skull X-rays showed no positive findings. However, T1 (pre-contrast) and T2 Weighted axial MRI [Figure 1a and b] showed a huge lobulated iso- to hypointense mass on both sequences, measuring 4 × 6 cm located in the trigone of the right lateral ventricle. The foci of hypointense areas within the tumor were due to tumor calcifications. Coronal and sagittal images showed brilliant enhancement post gadolinium administration [Figure 2a and b]. There was a surrounding halo of cerebrospinal fluid (CSF), perilesional edema and mass effect. The tumor was well delineated with associated lateral ventricular outlet obstruction. There was no intraparenchymal or intraventricular hemorrhage. The MRI signal intensities, the intraventricular location of the tumor and the age of the patient were typical of an intraventricular meningioma. His pre-operative hematological and biochemical profile were all within normal limits. Three weeks after presentation, the patient had a transparietal corticectomy [Figure 3a] with excision of the tumor. At surgery, a huge lobulated firm tumor weighing 250 grams was found within the right lateral ventricle [Figure 3b]. The estimated blood loss was 400 ml. The histologic examination of the excised tumor confirmed a calcified psammomatous intraventricular meningioma [Figure 4]. The patient started ambulating on the second day post-surgery and He was discharged after 2 weeks of uneventful post-operative period. He has been followed-up at the neurosurgical outpatient clinic for the past 23 months. His headaches have subsided significantly and he is now able to count fingers with the left eye having initial nil perception of light, whereas in the right eye, it remained at counting fingers.

Discussion

Intraventricular meningiomas are said to arise from remnants of arachnoid tissue within the choroid plexuses.[9] Because these tumors are situated deeply within the brain, they remain clinically silent until they attain a large size. Mass effect could give rise to symptoms like headache, visual defects, cognitive changes, memory loss, sensory, and motor impairment as well as seizures. This patient's visual symptoms could be explained by the compressive effect of the mass and the peritumoral edema on the fibers of the optic radiation which are located lateral and inferior to the ventricular trigone.

In Makoto's review of 16 cases,[8] 81.3% occurred mainly in the trigone of the lateral ventricle which is consistent with findings from other literature.[10,11] The tumor was found in the right lateral ventricle in this case although left sided tumor was found in several studies.[7,10]

The role of plain films is very limited and non specific. However, they are still in use where CT or MRI is not available. Plain radiographs may reveal hyperostosis, pneumosinus dilatans, increased vascular markings, calcification and lytic bone changes. On MRI, the tumor is iso- to hypointesnse to grey matter on T1 Weighted images; and iso- to hypointense or sometimes hyperintense on T2 Weighted images.[10] It

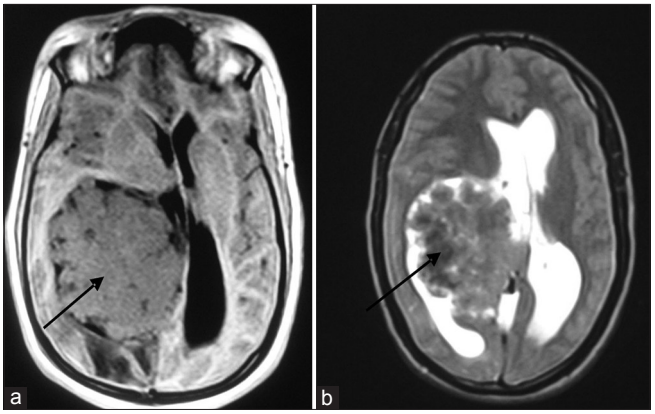

Figure 1: (a) (Pre contrast) T-1Weighted and (b) T2-Weighted Axial MR images. A lobulated right lateral ventricular mass is seen which iso-hypointense on T1 and T2 Weighted images. It is surrounded by a cleft of CSF and shows peritumoral edema and midline shift to the left side. The ipsilateral anterior horn, third ventricle, internal capsule and caudate nucleus are compressed

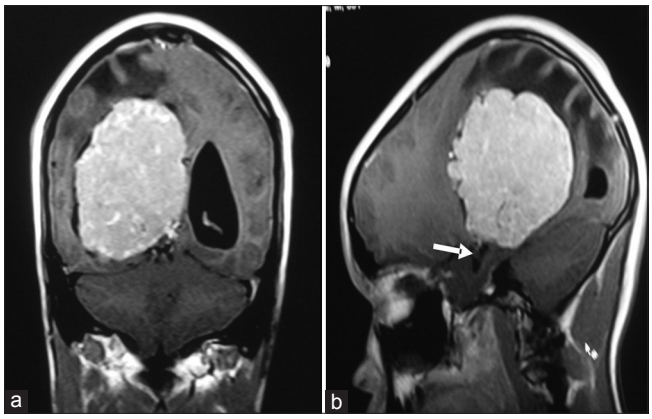

Figure 2: T1-weighted post contrast coronal (a) and sagittal (b) Magnetic resonance imaging showing avid contrast enhancement and enlarged lateral ventricles due to outflow obstruction

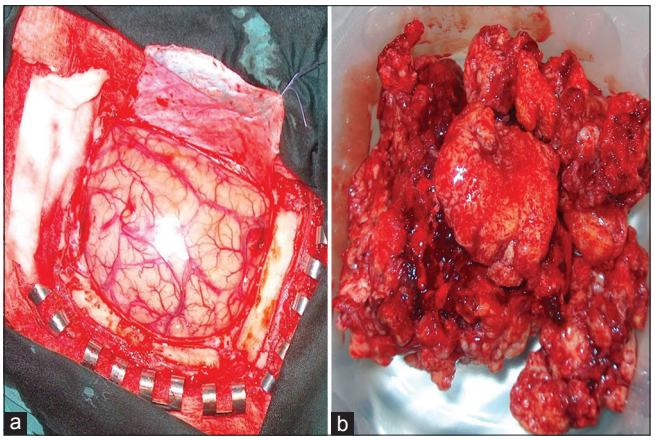

Figure 3: (a) Showing surgical (transparietal corticectomy) approach (b) Showing post-surgical tumor specimen

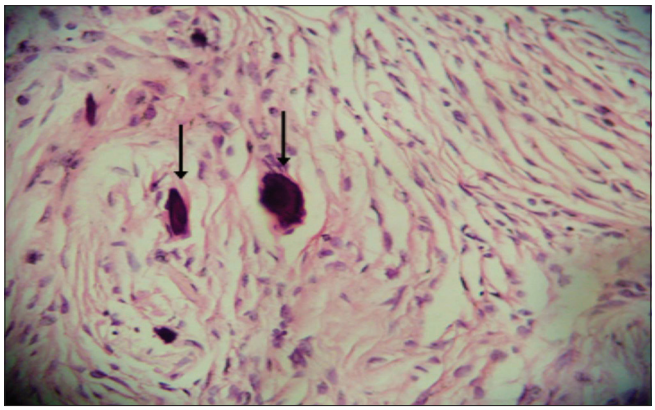

Figure 4: Histologic section of the tumor specimen (HE, ×200) showing typical calcified psammoma bodies (arrows)

enhances avidly post contrast administration except the cystic and calcified areas. These MRI findings were present in this case. The hypointense T2 characteristics are a key feature in differentiating meningioma from a choroid plexus papilloma in addition to the fact that the latter occurs mostly in the pediatric age group. Subependymomas shows similar MRI findings however, contrast enhancement pattern is variable, while subependymal giant cell astrocytoma is the most common tumor associated with tuberos sclerosis and typically occurs near the foramen of monro. Magnetic resonance spectroscopy has also been shown to lend a helping hand in differentiating meningiomas from mimics where presurgical diagnosis proves difficult.[12,13] Typical findings on spectroscopy are a high peaks from alanine and choline, and low from creatinine and N-acetylaspartate. CT may be more suited in demonstrating calcifications (seen in 10-20% of cases) and calvarial changes but enhancing dural tail and edema are better seen on MRI. Malignant IVMs which show no edema on CT may show perifocal edema on MRI. CT or MRI could suggest a the ventricular location by a cleft of CSF around the tumor, while ventricular dilatation is due to obstruction to CSF flow or a sequestrated occipital or temporal horn in relation to the tumor.

Intraventricular meningiomas are resistant to non-surgical management, and the aim of surgery is complete resection. Several surgical routes to the trigone has been described however, none has been defined yet as optimal.[14] This is because of the risks of damage to motor, sensory, speech tracts and most especially the visual pathway. The trigone also bears close relationship to neural structures, choroidal arteries and venous system. The Transparietal approach through the superior parietal lobe is the preferred route by many authors[15-18] and this was the method employed in our patient. It has the advantage of avoiding damage to the optic radiation and the language area.

IVM could be complicated by hemorrhage and rarely, malignancy. Tumor could also reoccur especially where complete resection was not achieved. None of these complications were demonstrated in our patient.

Conclusion

Intraventricular tumors could pose a radiological dilemma because of similarities in imaging features. Nonetheless, some characteristic findings could be helpful in arriving at concise and accurate differential diagnosis. We have presented the few but typical MRI features of an intraventricular meningioma which is a rare variety of a common brain tumor.

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