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Apraxia and Malformation Severity in Brain Tumor Disease: Case Report and Literature Review

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Abstract

Objective: In apraxia, the lack of skill in doing a previously learned task occurs without obvious weakness in the limbs.

Material and Method: In this case report, we present a with brain atrophy, diagnosed with posterior cortical atrophy and meningioma tumor in the frontal region, has referred to the clinic. In this patient, due to the analysis of the parietal and frontal cortex of the patient's brain, despite being able to write and draw shapes in the past, they now forget this skill and suffer from ideomotor apraxia. Also, this patient has slowness and weakness due to severe tumor involvement.

Result: Accurate and timely diagnosis of especially in prevalent can prevent the unwarranted complications and reduce the morbidity and mortality associated with in allogeneic/autologous transplant recipients.

Conclusion: This particular disorder is seen in patients with degeneration of the parietal and frontal cortex of the brain (in dementia, brain tumors and stroke).

Keywords: Brain Atrophy, Cortical Atrophy, Meningioma Tumor, Apraxia, Dementia, Stroke

Abbreviations: TBI: Traumatic Brain Injury, fMRI: Functional Magnetic Resonance Imaging, PET: Positron Emission Tomography, NPF: Neuropsychological Functioning

Introduction

Limb apraxia can include a wide range of higher order movement disorders that result from an acquired brain disease that affects the performance of learned and skilled movements. According to the existing definitions and history of this disorder, this disorder cannot be caused by the effects of elemental neurological defects such as weakness, loss of sensation, abnormalities of posture, tone or movement. but also to cognitive deficits such as impaired attention or comprehension. or lack of patient cooperation **[1,2]**. Clinical presentation with Brain Tumor can occur prior to the detection of underlying malignancy, or it may be detected following the diagnosis and sometimes during chemotherapy for the underlying malignancy. Here we present a male patient who presented with unilateral Ideomotor apraxia as the clinical presentation of Brain tumor.

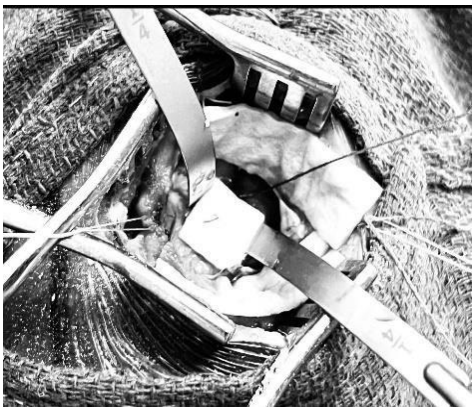
Case presentation

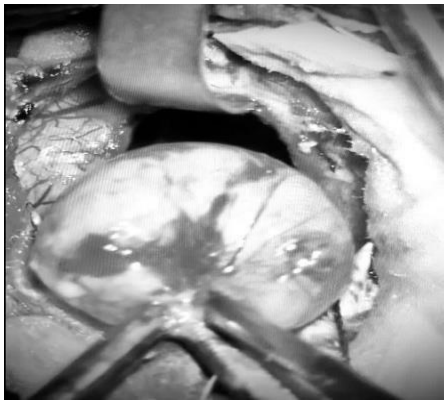
A 55-years-old with brain atrophy has referred to the hospital with the diagnosis of posterior cortical atrophy and observation of meningioma tumor in the frontal region. the patient underwent a craniotomy and a neurophysiological assessment before and after surgery.

This patient, due to the analysis of the parietal and frontal cortex of the patient's brain, despite being able to write and draw shapes in the past, they now forget this skill and suffer from ideomotor apraxia. Also, this patient has slowness and weakness due to severe tumor involvement.

The MRI obtained from the patient, which was performed with a quality of 0.3 Tesla, the distance between the parts of the two caudate nuclei was measured in the lowest axial section where the lateral ventricles can also be seen. In patients with brain atrophy, due to the shrinkage of the brain tissue and the widening of the ventricles, and the subsequent increase in the distance between the inner part of the two caudate nuclei and being fixed.

During the surgery, a mass measuring 4.3 cm with a thickness of about 1.5 cm, with an elastic consistency and strong adhesion to the outer layer of the skull bone, which was accompanied by severe bleeding, and the surface of the skull bone was resection.





Discussion

As part of a patient workup before surgery for intracranial tumors, our research group routinely administer neuropsychological tests, in order to better understand the cognitive status of patients; in particular, we aim to understand the impact of surgery and adjuvant treatments on patients undergoing surgery for meningiomas and gliomas.

We can speculate that even focal brain tumors may cause a global cognitive deficit, may be influenced by this general impairment, without a specific correlation to the side and site of the lesion and resulting a too difficult task to cope with.

Examination of apraxia in clinical disorders with known neuropathology has also contributed to the understanding of the neural correlates of the praxis system **[3]**. a syndrome characterized by at least a 2-year progressive loss of expressive language functions in the absence of other symptoms of dementia **[4]**. A disorder of the praxis production system is called ideomotor apraxia, where as a disorder of the praxis conceptual system is called conceptual or ideational apraxia.

There is confusion about the term “apraxia” as it has been applied to a number of disorders that are not cognitive-motor disorders of the upper limb.

Apraxia has also been used to describe oral motor disorders like Bucco facial (oral) apraxia and apraxia of speech. Because these two disorders are often associated with an elemental motor problem involving the lips, face, tongue, or oral pharynx and frequently co-occur with aphasia, these apraxia subtypes cannot easily be disassociated from sensorimotor or language deficits.

Limb apraxia (dyspraxia in developmental disorders) can occur in a variety of acquired neurological conditions including stroke, Alzheimer’s disease, and other neurodegenerative disorders (e.g., Parkinson’s disease and corticobasal degeneration), and in many developmental disorders such as autism spectrum disorder and specific

language disorder. Limb apraxia may also follow traumatic brain injury (TBI) at any age **[5,6]**.

the neural network responsible for mediating learned, skilled movement. Specifically, gesture to command, the classic test of limb apraxia, requires that auditory input via primary auditory cortex (Heschel's gyrus) project to auditory association cortex (Wernicke's area), which in turn flows to motor association cortex (Brodmann's area 6) **[7-9]**.

The more recent studies in apraxia have used methods such as functional magnetic resonance imaging (fMRI) and positron emission tomography (PET) to provide evidence to substantiate, refute, or rework the traditional cognitive models of limb apraxia. The Clinical model of apraxia, demonstrating the flow of information from input to output, is illustrated in **Figure 1**.

Figure 1: a clinical praxis model

Lesion localization in Brain Tumor provides a reductionist model to evaluate the critical brain regions involved in the production of learned skilled movements (praxis production network) and in the action-semantic knowledge (praxis conceptual network) necessary for selecting appropriate limb movements.

This article will include a summary of controversies and consensus regarding current treatment models, as well as the evaluation of limb apraxia.

In the past decade, some novel approaches have been developed to treat patients with limb apraxia. The evidence is limited but encouraging because several studies have found that rehabilitation of limb apraxia improves daily living in patients with Brain Tumor, Stroke and in corticobasal degeneration **[10-12]**. In contrast to these encouraging results, several case reports or small case series have found that direct treatment of limb apraxia may not generalize **[13-15]**.

Preservation of neuropsychological functioning (NPF) of neurosurgical patients is becoming primary in order to preserve the quality of life and individual functional status **[16-21)**.

Although several authors are trying to understand the relationship between NPF and treatment for brain tumors, there are still many factors influencing the variability of the results related to the neuropsychological testing (e.g. tumor location, size of the tumor, kind of tumor and brain edema) **[22-25]**.

Besides demographic factors, also pathological conditions can affect visuospatial and constructive abilities, such as pathological cognitive decline and focal brain lesions **[26]**.

Apraxia is a complex impairment which can result after a series of condition, pathological or not. Elderly patients with meningiomas or HGG may have several risk factors (age, tumor-induced cognitive deficit and depression) for showing apraxia in the neuropsychological assessment and the related impairment in daily life, even in case of a focal lesion **[19]**.

meningiomas, as a benign lesion, grow slowly and show a progressive cognitive decline which tend to slowly recover after surgery. On the other hand, HGG, as a malignant tumor, grow fast and cause a fast neuropsychological impairment which tend to be recovered immediately after surgery **[27]**.

Conclusion

Kleist and Gainotti first described the neural defect of apraxia, which compromises constructive and drawing abilities when the final shape of the reproduced object is inadequate, in the absence of any motor or perceptual impairment. It affects, especially when another abnormality is the cause **[28,29]**. However, because it is a case report, this study is limited; therefore, conduct of additional complementary studies involving larger case numbers is warranted.

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Ethics approval

Our institution does not require ethical approval for reporting individual cases or case series.

Informed consent

Written informed consent was obtained from a legally authorized representative of the subject to anonymized information to be published in this article.

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