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PRESENTING SYMPTOMS OF RELIGIOUS DELUSIONS AND HALLUCINATIONS IN TEMPORAL LOBE GLIOBLASTOMA

Jakov Tiefenbach[1], Karlo Toljan[2], Elias A. Khawam[3] & Adele C. Viguera[3]

1 Department of Neurosciences, Lerner Research Institute, Cleveland Clinic, Cleveland, OH, United States
2 Department of Neurology, Neurological Institute, Cleveland Clinic, Cleveland, OH, United States
3 Department of Psychiatry and Psychology, Neurologic Institute, Cleveland Clinic, Cleveland, OH, United States

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INTRODUCTION

An association between acute psychotic episodes and temporal lobe tumors is well-established (Boele et al. 2015). Published case reports suggest patients with a temporal lobe tumor may infrequently develop psychotic symptoms (Madhusoodanan et al. 2015). In one case series, such symptoms resolved following removal of the associated brain tumor, thus providing a degree of possible causality to support this association (Ouma 2004). However, the presence of religious delusions and hallucinations as presenting symptoms of temporal lobe tumors has rarely been reported in the literature (Carmona-Bayonas et al. 2017, Dutschke et al. 2017). We present a case consistent with the latter.

CASE REPORT

A seventy-one-year-old male was admitted to the hospital following a syncopal episode. At the time, he reported frequent episodic auditory hallucinations in the days leading up to the incident. He would hear instrumental music playing, but no associated singing or other vocalizations. He was not previously treated by a psychiatrist. There was no family history of psychiatric disease and the patient denied taking psychoactive substances, which was corroborated by closest family and with a negative standard urine toxicology screen. Urgent head imaging was done, and findings were consistent with a temporal lobe mass (Figure 1A). A subsequent biopsy confirmed the diagnosis of glioblastoma (IDH-wildtype, World Health Organization Grade 4). Following multidisciplinary assessment, a surgical resection with radiotherapy and temozolomide 75 mg/m^2 for 42 days, followed by 6 cycles of temozolomide 150 mg/m^2 was recommended as treatment. The gross total resection of the tumor was performed (Figure 1 B) and the first dose of radiotherapy was administered 3 weeks later. The patient responded well, with auditory hallucinations subsiding following treatment initiation.

The treatment course was well tolerated and without adverse events until 6-month post-surgery, when the patient presented with subacute dysarthria, shuffling gait,

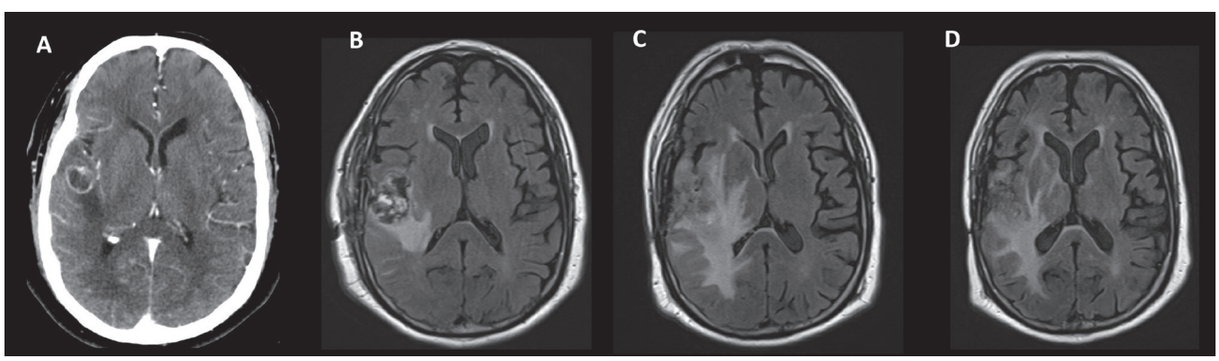

Figure 1. – **Serial brain scans over the described disease course.** Initial contrasted CT head scan demonstrating right temporal lobe mass with concentric pattern of enhancement, later biopsied and confirmed to be consistent with glioblastoma (A). Brain MRI scan (T2/FLAIR sequence) with notable postoperative changes (B). Follow-up brain MRI (T2/FLAIR sequence) with interval increase in tumor size and associated edema (C). Repeat brain MRI (T2/FLAIR sequence) showed slight interval decrease in associated edema (D).

encephalopathy, and short-term memory loss. Updated brain MRI was concerning for disease progression (Figure 1C). This was acutely addressed with oral dexamethasone (4 mg twice daily), which resolved most of the newly noted deficits. Three weeks later, a dexamethasone taper was started (4 mg in the morning and 2 mg in the afternoon). Following the adjustment, the patient started developing agitation, pressured speech, religious preoccupation, and delusional thinking. The delusions were religious in nature, focused on "the God" and "the Universal Truth". The patient claimed to have powers that others did not, and that "God is planning to reveal to the world through his primary care physician". In addition, he could hear "God's" voice speaking directly to him, although no visual hallucinations were noted. The patient's family observed the patient suffering from restlessness and frequent episodes of waking up throughout the night to read the Bible. Dexamethasone was increased to 4 mg twice daily, but ongoing symptoms prompted an admission two weeks later.

An updated brain MRI scan was notable for interval decreased, yet persisting, edema associated with the primary tumor (Figure 1 D). To address symptoms acutely, olanzapine 10 mg daily was started, and a dexamethasone taper was initiated. The condition gradually improved over the next four days and his functioning returned to baseline. He was discharged home and there were no recurrent psychotic symptoms. Ultimately, olanzapine was adjusted to 5 mg in the morning and 10 mg at bedtime, with dexamethasone reduction to 2 mg daily. The patient passed away four months later due to his primary illness.

DISCUSSION

Cases describing patients developing hyper-religiosity in the context of a temporal lobe associated tumor have been published. In one case, a 60-year-old woman with a prefrontal tumor and associated involvement of the temporal lobe developed a growing interest in the Bible and other sacred writings, religious logorrhea, and was spending hours or days recording her mystical sessions during which she reported interacting with Virgin Mary. (Carmona-Bayonas et al. 2017). In another report, a 48-year-old woman presented to the emergency service with religious delusions, auditory hallucinations, and a "distinct feeling of blessedness". Subsequent brain MRI revealed an ovoid thalamocapsular lesion, later confirmed to be a low-grade glioma. The tumor occupied a region around the medial geniculate nucleus, and likely compressed its neuronal projection into the auditory cortex of the temporal lobe (Dutschke et al. 2017).

The underlying mechanism through which temporal lobe tumors lead to psychotic symptoms remains poorly understood. A recent literature review concluded that there is a positive correlation between thought processing disorder and volume alteration in the right anterior superior temporal gyrus, as well as auditory hallucinations and the alteration of the middle temporal gyrus (Kaur et al. 2020). Furthermore, it is suspected that the dysfunction of the hippocampus may lead to a dysregulation of glutamine and dopamine neurotransmitters within the hippocampal-striatal-midbrain network, which is known to be affected in schizophrenia (Allen et al. 2019). Therefore, it is reasonable to hypothesize that an aggressive tumor disrupting the neural circuits or structures could subsequently result in a clinical presentation recognized as psychosis. Factors influencing the severity and content of associated delusions and hallucinations remain unknown. The relative rarity of religious themes in association with temporal lobe tumors remains unclear and may be possibly underreported.

It is important to acknowledge that the presented patient was receiving a moderate dose of steroids (8 mg dexamethasone daily) in the weeks preceding the acute presentation. Steroid use is a well-recognized cause of acute psychosis, even when administered in lower doses (Janes et al. 2019, Robinson et al. 2000). While in this case it remains unclear whether the progression of the primary tumor or the oral steroid therapy was the primary culprit, a multifactorial etiology seems likely. It is plausible that the underlying volume alteration and tissue disruption by the temporal lobe glioblastoma made the patient more susceptible to the psychosis-inducing effects of steroids, which triggered the acute episode.

Our case highlights a rare presentation of acute religious delusions and hallucinations in the context of temporal lobe glioblastoma and low-to-moderate steroid use. More research is needed to better understand the association between temporal lobe tumors and psychosis.

Ethical Considerations: Does this study include human subjects? YES Authors confirmed the compliance with all relevant ethical regulations.

Conflict of interest: No conflict of interest

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Correspondence:
Karlo Toljan
9500 Euclid Ave, S10, Cleveland, Ohio,
44106, United States
toljank@ccf.org, (+1) 216-444-2200