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Case Report

Religious conversion in an older male with longstanding epilepsy

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ABSTRACT

Religious experiences in epilepsy patients have provoked much interest with suggestions that hyperreligiosity is associated with temporal lobe seizures. Extreme varieties of religious behavior may be more frequent in epilepsy patients during ictal activity or during post-ictal psychotic episodes. We report a 75 year-old man with epilepsy who developed a progressive decline in cognition and behavior following a religious conversion 15 years earlier. He subsequently developed religious delusions of increasing severity and symptoms of Capgras syndrome. Brain imaging revealed bilateral posterior cortical atrophy, chronic right parieto-occipital encephalomalacia, and right mesial temporal sclerosis. Electroencephalograms and neuropsychological testing revealed initial right temporal lobe abnormalities followed by progressive frontal and bilateral dysfunction. The case highlights how a history of seizures, superimposed on sensory deprivation and a progressive impairment of right posterior and bilateral anterior brain function, may have contributed to religious conversion, which was followed by dementia and delusions involving religious content.

1. Introduction

The topic of epilepsy and religion has generated interest and controversy for centuries. The ancient Greeks characterized epilepsy as the Sacred Disease and a history of seizures was present in numerous prophets and founders of religious movements [1,2]. Overall, epilepsy patients hold similar religious practices and beliefs as individuals without epilepsy [2,3]. However, patients with localization-related epilepsies, particularly with temporal lobe epilepsy (TLE), may be more inclined to experience intense spiritual beliefs and interests, including those involving religion [4]. Patients who experience intense spiritual phenomena often have right temporal lobe seizures foci [1].

Multiple cases of religious conversion have been reported in temporal lobe epilepsy patients [5]. In many cases, religious conversion appears to develop during an intense spiritual experience associated with seizure activity [1]. Intense religious experiences with delusional features also occur with postictal psychosis. One study of religious ideation in TLE patients found that the phenomenon occurred in the context of a postictal psychosis in 27% of the cases [6]. High rates of religiosity can also occur with interictal psychoses [7]. The high rate of religious delusions in schizophrenic patients may reflect temporolimbic disturbance [8]. Hyperreligiosity can also occur with neurodegenerative disorders such as frontotemporal dementia [9,10]. Thus, multiple clinical conditions and neuroanatomic pathways are associated with intense religious experience in patients with brain disorders.

We present the neurological, neuroimaging, neurophysiological and neuropsychological findings in a 75-year-old man with chronic epilepsy and mood disorder who began exhibiting increasing agitation.

2. Case report

2.1. Clinical history: psychosocial and psychiatric history

The patient was born and raised in New York City in the 1940's with two parents and a brother. His mother was a homemaker and father was a commercial painter. Both parents were born in the United States and English was the primary language spoken in the home. The family was Jewish whose ancestors had immigrated from Eastern Europe.

He reported difficulties in school, for which he takes blame for not applying himself. There was no reported learning or attentional disorder. He completed high school and went on to a career in

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retail sales. He reported that he had "retired" in 2003, although his family reported that he had been fired due to declining performance. He resided with his wife in New York City and had two grown daughters. All four continued with Jewish religious practices. He had spent time recently volunteering for a charity group that involved work in Catholic churches. He enjoyed reading newspapers and listening to talk radio.

The patient received an initial evaluation through the neurology service in 2014. It was reported that additional changes in behavior began 5–10 years earlier when he underwent a religious conversion. He was raised in the Jewish faith and reported a conversion to Catholicism following his experience of a revelation while viewing a religious painting of the Virgin Mary at a local church. He stated that since that episode he felt the constant presence of a guardian angel who had accompanied him and provided ongoing guidance. There were also reported episodes of suicidal ideation and paranoia. The differential diagnosis included interictal personality disorder, a psychotic process, or early dementia. He stated at the time of the initial evaluation that there was stress in the family surrounding religion and plans for final arrangements following his passing.

The patient's family reported that he had developed intermittent sleep disturbance and paranoid delusions in his 40's but he did not receive any formal psychiatric evaluation or treatment until his 60's when he underwent a underwent a 3-week hospitalization in 2003 for suicidal ideation after he became despondent after losing his job. This was followed by outpatient psychiatric and psychotherapeutic treatment. He stated that he remained adherent with the psychiatric treatment but discontinued the psychotherapy after two years once the "guardian angel took over". He reported continuing communication with the guardian angel and with God since that time. He felt that a psychiatrist had been against him because of his religious conversion and he therefore changed providers.

He was adherent with aripiprazole, valproic acid, and escitalopram therapy. A prior episode of postictal psychosis in summer 2015 was exacerbated by levetiracetam. On evaluation in our department in the fall of 2015, he reported symptoms of depression, including loss of interest in activities and frequent thoughts about dying.

2.1.1. Medical and epilepsy history

There was no history of birth complication. The patient was presumed to have had infectious encephalitis at a young age, possibly in the context of polio. However, he reported having mumps and receiving a "vaccination" which made him very ill. He developed seizures from the age of 10 onwards in addition to mild left leg weakness, which affected running but later resolved. He was physically active during his young and middle adulthood, and reported he completed two marathons. He had become less physically active in recent years.

Medical history included hypertension, osteoporosis, bilateral sensioroneuroal hearing loss, and glaucoma, which caused blindness in the right eye. He had numerous falls in recent years, causing fractures of the left clavicle and multiple ribs. He was treated for hypertension and experienced intermittent falls. The family history was significant for heart disease (father), depression (father), suicidal ideation (father and maternal cousin), and a "muscular disorder" (brother).

The patient reported a history of focal to bilateral tonic-clonic (FBTC) and focal impaired awareness seizures (FIAS) since childhood. He stated that he had not experienced FBTCs in a decade. The FIASs occurred a few times per month and consisted of, "not being aware of what's happening to me" and "my mind is vibrating". He was treated successfully in the past with multiple antiseizure medications including phenobarbital and phenytoin. At the time of his initial presentation in 2014, he was reporting between 2 and 4 FIASs per month.

2.2.1. Neurologic work-up: electroencephalographic and imaging findings

Electroencephalographic results were obtained from an admission for long-term video-EEG monitoring (LTVEM) in 2015. During that admission, he experienced three electroclinical seizures characterized by impaired awareness and oral automatisms, correlating with ictal electrographic onset from the right temporal region and posterior quadrant. Interictal EEG demonstrated right temporal sharp discharges and focal attenuation and delta slowing involving the right temporal region.

Brain MRI in 2014 showed atrophy and abnormal signal within the right hippocampus with slight atrophy of the right mammillary body (see Fig. 1), consistent with mesial temporal sclerosis. There was evidence of mild interval progression of nonspecific deep white matter signal abnormality consistent with chronic small vessel ischemic disease. There were indications of chronic encephalomalacia, atrophy, and gliosis involving the right parietal-occipital region consistent with prior posterior cerebral artery territory infarction, which was believed to have been present well in advance of imaging performed in 2007. This finding was unchanged, based on a previous imaging report. Finally, there was evidence of focal cortical atrophy involving the bilateral parieto-occipital regions, superimposed on moderate global atrophy.

2.2.2. Neuropsychological assessment

Neuropsychological test scores from winter 2015 are summarized in Table 1. His performance was in the average range of general intellectual ability with no signs of any general cognitive decline. Cognitive functions were normal on many tasks, with performance decrements observed on tests of working memory, processing speed, cognitive flexibility, problem solving, naming, semantic fluency, and episodic memory. The short form of the Wisconsin Card Sorting Test (WCST-64) was discontinued due to conceptual difficulties and perseveration. He exhibited relative strengths on measures of visual and spatial functions.

From a behavioral perspective, the patient appeared rather depressed during the neuropsychological examination and was rather perseverative in reference to religious content. He reported emotional disturbance on standardized self-report symptom inventories, with features of depression, anxiety, and thought dysfunction. These symptoms were causing significant impairment in his activities of daily living. Minnesota Multiphasic Personality Inventory (MMPI-2-RF) scores are summarized in Table 2. The profile indicated a mood disorder with delusional features. An item analysis revealed endorsement of paranoid delusion and thought broadcasting.

The overall neuropsychological testing showed impairments in language, executive functions, and memory without general cognitive decline. Results were complicated by visual and hearing difficulties and depressive and anxiety symptoms. He was diagnosed with Mild Neurocognitive Disorder. While there was test evidence of executive dysfunction, the prominence of the episodic memory and semantic retrieval deficits was more consistent with Alzheimer's disease (AD) than frontotemporal dementia (FTD). Visuospatial and constructive functions (e.g., blocks & drawing) were relative strengths, which was inconsistent with posterior cortical atrophy (PCA). Responses to self-report questionnaires were

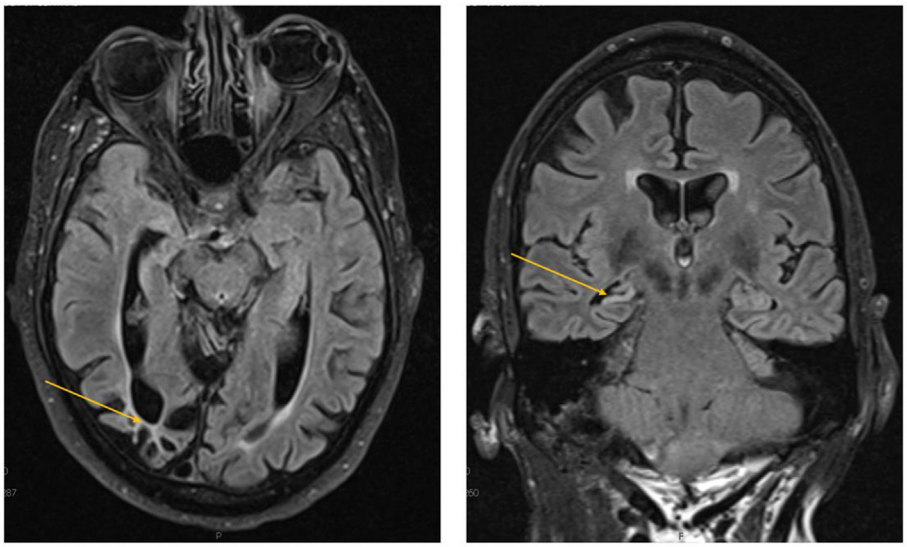

Fig. 1. MRI brain. Left. Axial View, FLAIR. Demonstrates chronic right parieto-occipital encephalomalacia likely due to prior right PCA territory infarct, superimposed on bilateral parietooccipital cortical atrophy. Right. Right hippocampal sclerosis.

indicative of a dysphoric mood accompanied by a mild psychotic disorder with delusional features.

2.3. Clinical course

The patient returned for another admission for LTVEM in the fall of 2019 to assess possible subclinical seizures. His family reported functional decline, increasing confusion, and delusions of grandeur before admission. He was taking medications as prescribed and there was no reported increase in seizure activity. LTVEM recorded no clinical or subclinical seizures but showed frontal intermittent rhythmic delta activity, right occipital polymorphic slowing and right temporal polymorphic slowing and sharp waves during wakefulness and sleep. There were also indications of sleep potentiated left temporal sharp waves. He was started on quetiapine to treat delusions.

He returned to the hospital one month later due to further behavioral decline, including an attempt to leave his house alone in cold weather without a coat as well as increasing paranoid delusions and agitation. Evening delusions increased and prevented him from sleeping through the night. On one occasion, he locked himself in his bathroom, believing his wife was the Devil and was trying to hurt him and other family members. He stopped using his glasses because he believed that God was going to cure his vision. The family was unsure if he experienced hallucinations, although none were reported when questioned on clinical exam.

On examination, he was disoriented and was unable to state the reason for the hospital visit. His poor vision was attributed to worsening glaucoma. A brain CT showed no acute intracranial process. During admission, he exhibited increasing agitation and was noted to be yelling threatening statements to the Devil. He attempted to place a cross with a chain into his mouth. Capgras Syndrome features included a belief that his wife was replaced by an "evil doppelganger".

Repeat neuropsychological testing was limited due to disorganized thinking, hearing loss, and poor vision. Overall functioning was markedly lower than four years before, with a Mattis Dementia Rating Scale score falling from 137/144 correct to 113 (out of 144), below the cutoff for "dementia". He was transferred to psychiatry for medication adjustment and discharged to a subacute rehabilitation facility.

3. Discussion

This case shared many features of prior reports of religiosity in epilepsy patients [1,2]. The patient had epilepsy developing after presumed childhood encephalitis. EEG recordings supported right TLE, a site in the brain associated with religious experiences [1]. A decline in work performance and mood disorder were associated with increased seizure frequency. During that time, he experienced a religious conversion followed by a sense of having a guardian angel protecting him. While the patient's seizure activity at the time of the religious conversion is unknown, the experience may have originated in the context of an individual seizure or postictally after a cluster of seizures, similar to other cases [1,5].

A novel feature of our case is the progression from the initial religious conversion to dementia accompanied by development of religious delusions. Neuropsychological testing at mid-course indicated mild cognitive changes with an underlying psychotic process. During that time, he was hospitalized during a post-ictal psychosis. Patients with epilepsy and hyperreligiosity exhibit increased rates of postictal psychotic episodes and bilateral cerebral dysfunction [2]. While this patient had initial EEG and MRI findings demonstrating right hemisphere abnormalities, signs of language dysfunction and both left side and bilateral frontal EEG changes were identified over time, suggesting a progressive course with bilateral dysfunction.

The patient was readmitted four years later with a psychotic disorder dominated by cognitive decline, Capgras syndrome, and religious delusions. Bilateral sensorineural hearing loss and poor vision developed after the religious conversion, but likely contributed to the dementia and his vulnerability to psychosis [11]. Neuroimaging demonstrated posterior cortical atrophy, although the neuropsychological and neuropsychiatric presentation was atypical for the neurodegenerative syndrome of PCA [12,13]. However, his abnormalities in the right parietal-occipital cortex and frontal lobes were consistent with what is reported in many individuals developing organic delusions including Capgras syndrome [14,15]. The religious nature of the delusions associated with Capgras Syndrome in this case is a likely a result of previously occurring delusions [15]. While changes in religious behavior are not commonly seen in most cases of dementia, features of the so-called Geschwind Syndrome and changes in religious ideology

Table 1
Neuropsychological test data.

	Raw Score	Normative Score
Test of Premorbid Functioning (TOPF)	28	SS = 90
Wechsler Abbreviated Scale of Intelligence (WASI-II)		
Verbal Conceptual Index (VCI)		SS = 95
Vocabulary	36	*T* = 50
Similarities	22	*T* = 44
Perceptual Reasoning Index (PRI)		SS = 82
Block Design	20	*T* = 46
Matrix Reasoning	5	*T* = 32*
Mattis Dementia Rating Scale (MDRS-2)		
Attention	36	ss = 11
Initiation/Perseveration	33	ss = 7
Construction	6	ss = 10
Conceptualization	39	ss = 13
Memory	23	ss = 10
Total Score	137	ss = 10
RBANS		
Immediate Memory	SS = 85	
List Learning	17	ss = 4*
Story Memory	17	ss = 11
Visuospatial/Construction	SS = 89	
Figure Copy	16	ss = 7
Line Orientation	17	51–75%ile
Language	SS = 85	
Picture Naming	9	26–50%ile
Semantic Fluency	10	ss = 4*
Attention		SS = 82
Digit Span	11	ss = 11
Coding	19	ss = 3*
Delayed Memory		SS = 56
List Recall	0	< 2%ile*
List Recognition	15	< 2%ile*
Story Recall	3	ss = 4*
Figure Recall	7	ss = 6
Total Score		SS = 74
Digit Span (WAIS-IV)	19	ss = 8
Trail Making Test		
Part A	92	ss = 5*
Part B	300	ss = 2*
Letter Fluency (CFL)	35	ss = 10
Semantic Fluency	19	ss = 3*
Boston Naming Test	41	ss = 6

ss = Scaled Score; SS = Standard Score; *T* = *T*-score; * = Score interpreted as falling below (<1.5 standard deviation) age-matched norms; RBANS = Repeatable Battery for Assessment of Neuropsychological Status; WAIS-IV = Wechsler Adult Intelligence Scale, Fourth Edition.

Table 2
Scores from the Minnesota Multiphasic Personality Inventory (MMPI-2-RF).

		T-scores
F-r	Infrequent Responses	*T* = 83*
L-r	Uncommon Virtues	*T* = 57
K-r	Adjustment Validity	*T* = 31
EID	Emotional/Internalizing Dysfunction	*T* = 71*
THD	Thought Dysfunction	*T* = 74*
BXD	Behavioral/Externalizing Dysfunction	*T* = 57
RCd	Demoralization	*T* = 77*
RC1	Somatic complaints	*T* = 59
RC2	Low Positive Emotions	*T* = 65
RC3	Cynicism	*T* = 57
RC4	Antisocial Behavior	*T* = 62
RC6	Ideas of Persecution	*T* = 70*
RC7	Dysfunctional Negative Emotions	*T* = 62
RC8	Aberrant Experiences	*T* = 66*
RC9	Hypomanic Activation	*T* = 48

T = *T*-score; * = Score interpreted as falling above (>1.5 standard deviation) age-matched norms

can occur with FTD [9,10], raising a possibility that this patient's behavioral changes might have resulted from that disorder. However, the age of onset of dementia and neuropsychological profile were more consistent with AD than FTD, common to what is seen in many other cases of epilepsy [16].

4. Conclusions

This case demonstrates how comorbid pathophysiologic processes can lead to a progressive decline in cognition, delusional thought and hyperreligiosity in a patient with epilepsy. The initial religious conversion may have occurred around the time of a seizure or seizure cluster. However, the subsequent decline in behavior, including religious and other delusions, developed in association with progressive changes in the right parietal-occipital cortex and the frontal lobes. This case highlights how a progressive disturbance of multiple brain regions can contribute to the clinical progression from religious conversion through the development of dementia and delusions with religious content.

Ethical statement

This manuscript presents data collected as a part of routine clinical care. It was not classified as research by the NYU Langone Health Institutional Review Board and did not require specific Institutional Review Board approval to submit for publication.

The subject of this case report has given informed, written, signed consent for the disclosure of information for publication.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

References

[1] Devinsky O, Lai G. Spirituality and religion in epilepsy. Epilepsy Behav 2008;12(4):636–43.
[2] Trimble M, Freeman A. An investigation of religiosity and the Gastaut-Geschwind syndrome in patients with temporal lobe epilepsy. Epilepsy Behav 2006;9(3):407–14.
[3] Tucker DM, Novelly RA, Walker PJ. Hyperreligiosity in temporal lobe epilepsy: redefining the relationship. J Nerv Ment Dis 1987;175(3):181–4.
[4] Waxman SG, Geschwind N. The interictal behavior syndrome of temporal lobe epilepsy. Arch Gen Psychiatry 1975;32(12):1580–6.
[5] Dewhurst K, Beard AW. Sudden religious conversions in temporal lobe epilepsy. Br J Psychiatry 1970;117(540):497–507.
[6] Ogata A, Miyakawa T. Religious experiences in epileptic patients with a focus on ictus-related episodes. Psychiatry Clin Neurosci 1998;52(3):321–5.
[7] Slater EA, Beard W, Glithero E. The schizophrenia-like psychoses of epilepsy. Br J Psychiatry 1963;109:95–150.
[8] Saver JL, Rabin J. The neural substrates of religious experience. J Neuropsychiatry Clin Neurosci 1997;9(3):498–510.
[9] Postiglione A, Milan G, Pappatà S, De Falco C, Lamenza F, Schiattarella V, et al. Fronto-temporal dementia presenting as Geschwind's syndrome. Neurocase 2008;14(3):264–70.
[10] Miller BL, Seeley WW, Mychack P, Rosen HJ, Mena I, Boone K. Neuroanatomy of the self: evidence from patients with frontotemporal dementia. Neurology 2001;57(5):817–21.
[11] Prager S, Jeste DV. Sensory impairment in late-life schizophrenia. Schizophr Bull 1993;19(4):755–72.
[12] North C, Desai R, Saunders R, Suárez-González A, Bamiou D, Costafreda SG, et al. Neuropsychological deficits in Posterior Cortical Atrophy and typical Alzheimer's disease: A meta-analytic review. Cortex 2021;143:223–36.
[13] Isella V, Villa G, Mapelli C, Ferri F, Appollonio IM, Ferrarese C. The neuropsychiatric profile of posterior cortical atrophy. J Geriatr Psychiatry Neurol 2015;28(2):136–44.
[14] Barr WB. Neurobehavioral disorders of awareness and their relevance to schizophrenia. In: Amador XF, David A, editors. Insight and psychosis. New York: Oxford University Press; 1997.
[15] Devinsky O. Delusional misidentifications and duplications: right brain lesions, left brain delusions. Neurology 2009;72(1):80–7.
[16] Hommet C, Mondon K, Camus V, De Toffol B, Constans T. Epilepsy and dementia in the elderly. Dement Geriatr Cogn Disord 2008;25(4):293–300.