Case report

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The vitamin D dilemma; mood, memory, and misdiagnosis

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Mrs. I is a 59-year-old mother of three daughters. She had been working abroad and came to Sri Lanka 6 months ago from admission. This was her first presentation to the psychiatric services. She had been functioning well abroad as a domestic helper for the last 6 years without difficulty. One month ago, Mrs. I had plans to come to Sri Lanka for a leave and she was in the process of gathering items to bring home.

Her house owner was not happy about her leaving, and she had requested her to stay as Mrs. I was attending to work properly. Mrs. I had refused the request, and that had led to several arguments.

After coming to Sri Lanka, though she had attended to her day-to-day work, there was a gradual change in her behavior. Mrs. I became irritable at times. She was verbally abusive towards her husband, daughter, and even her grandchildren. Recently she tried to hit the grandchild. She talked in a slightly different way. She gave short answers to the questions. Always replied with "I don't know" answers. Her daughter had noticed she was muttering to herself when she was angry and irritable. She mentioned that "the house owner needed to be killed." But she never attempted to do such a thing. She did not claim that she was re-experiencing that traumatic incident or getting recurrent flashbacks.

During this period, she had disturbed sleep. She used to wander inside the house at night. Her appetite had been reduced, but there was no significant weight loss. Her energy level was normal. She was interested in cleaning the house as earlier. There was no self-neglect. She did not have suicidal ideas. She did not have difficulty with attention and concentration.

However, she had regressed behavior. She had passed stool in her granddaughter's potty. On questioning about the reason she was indifferent to it.

She did not complain of any memory impairment/ forgetfulness. There was no word-finding difficulty. She could identify and recall the names of family members and others well. She was able to dress by herself.

She did not have hyperactivity, over-talkativeness, or self-expansive ideas. She was not suspicious about anything. She did not claim that she was being controlled by external forces or that her thoughts were known to others. She did not hear any voices of unseen people. She did not have any recurrent, repetitive, distressing, intrusive thoughts of any theme or repetitive actions. There was no excessive fearfulness.

There was no history of head trauma. She did not have constipation or cold/heat intolerance. She did not have any joint pains or fever. There was no urinary / fecal incontinence, repeated falls, tremors, or other movements.

There was no history of going out from home without informing and losing her way home.

There was no family history of psychiatric illness.

Her birth and developmental histories were uneventful. She had not experienced any traumatic experiences in early childhood other than financial difficulties.

She had been educated up to grade 9 and had to stop schooling due to financial difficulties. At school, she was good at singing and dancing. She can read and write properly. She had done several odd jobs after schooling.

She married at the age of 22 years following a romantic relationship. They had a peaceful marital life. Her husband is also good at music and dancing. They conducted a small boutique. At the same time, they conducted stage dramas by going place by place and gained a fairly adequate income.

She delivered 3 children. Her first daughter had passed away when she was three years of age due to a medical condition probably encephalitis. However, she coped with the loss fairly well. Meantime, as their financial status became low, she had to go abroad to work as a domestic helper.

She kept her two daughters with her husband and her mother. She had sent money and goods to them from time to time. She had worked in the same place for the past 15 to 20 years and she had a good rapport with the house owners. She visited the family from time to time and continued to work abroad. She was able to attend to

her duties without any problems at her workplace and home. She was very clever in making various food items and had no difficulty in handling electrical equipment. She could do banking, shopping, travel using public transport, and use a mobile phone. While she was working abroad, she used to communicate daily with her youngest daughter and husband.

She has been in menopause for the last 3 years. Her sexual orientation was heterosexual. She did not have any sexually deviant behaviors. She did not have any abnormal sexual preferences. She denied having an extramarital relationship.

She did not use any psychoactive substances in the past. She didn't have any contacts with law enforcement authorities.

She did not have medical or surgical comorbidities.

Mrs. I was a very courageous lady who had overcome great difficulties in her life. She had good relationships with her family members and significant others. She was a loving and caring mother and a wife. She enjoyed listening to music and dancing very much. She was a responsible person who had completed the tasks which were given to her during her work. She had anankastic traits. She is concerned about orderliness and cleanliness. Her prevailing mood was euthymic.

In mental state examination, she was an averagely-built female who dressed appropriately. She maintained a reasonably good self-care. She was distractable. Initially, I could not build up a good rapport with her. At times she was maintaining eye contact. She always wanted to go out of the interview room without any reason. There were no hallucinatory behaviors, tremors, or scars.

The rate and amount of the speech were low. The volume of the speech was normal. She always gave "I don't know." answers. The speech was coherent. In mood, subjectively she felt angry. Her objective mood was irritable. Mood was less reactive. The mood was congruent with the thought content. There were no suicidal ideas. She had homicidal ideas toward the house owner. She was always talking about the traumatic incident that happened while abroad. Her thoughts were full of anger and disgust toward the house owner.

There were no delusions, obsessions/ compulsions, or phobias. She did not have depressive cognitions. She had elementary visual hallucinations.

She was oriented in time, place, and person. Her attention and concentration were normal. In her short memory, registration and recall were impaired.

Long-term memory was normal.

Her insight was poor.

General examination was unremarkable. In the central nervous system examination, there was an exaggeration of bilateral tendon reflexes. Higher functions, cranial nerve examination, sensory, and cerebellar functions were normal. Her gait was normal.

All basic investigations including FBC, FBS, Lipid profile, liver and renal functions, ECG, ESR, Thyroid profile were normal.

Her serum calcium level was low. She had markedly low vitamin D levels. Serum PTH, ALP, and albumin levels were normal.

Initially, we thought about organic mood disorder in the context of vitamin D deficiency, and her low serum calcium levels and isolated exaggeration of tendon reflexes are also in favor of these findings. Initially, we started sertraline 25mg mane and titrated the dose up to 150mg mane.

Vitamin D and calcium replacement were initiated after liaising with the medical and endocrinology team. Since there was a poor response to treatment we planned further investigation. Her MMSE was 22/30 and there were lapses in orientation, recall, and obeying commands. In her extended cognitive function assessment, there were some deficits in frontal lobe functions. She had concrete thinking. Abstraction, similarities, letter, and categorical fluency were poor.

Parietal and temporal lobe function was normal.

According to available literature vitamin D deficiency also can contribute to cognitive disturbances we had doubts about whether vitamin D deficiency is the root cause of this clinical presentation. We liaised with the geriatric psychiatric team and their impression was also to see whether this can be reversible following vitamin replacement.

Since the patient was poorly responding we managed to do an MRI brain and it revealed cerebral atrophy with predominant involvement of the bilateral frontotemporal lobes and appearance could be due to frontotemporal dementia. However, the patient did not present with typical features suggestive of frontotemporal dementia. Meantime we exclude all the possible etiological factors by arranging TFT, and STD referral. We did CSF analysis as well since the presentation was atypical.

Discussion

This case had a dilemma in the diagnosis as well as in the management. It was a challenge to manage this patient.

This patient did not present with a typical history of dementia. It was the neuroimaging findings that revealed cerebral atrophy. Core symptoms at the presentation, were irritability, regression, and other behavioral changes noticed over the last 6 months. She did not have medical comorbidities or a family history of psychiatric illness. She was not in the typical age of onset of dementia but in the presenile age.

All the basic investigations available and possible specific investigations were arranged. Investigations were directed to explore the reason for hypocalcemia as the clinical picture favored hypocalcemia. Hypocalcemia causes neuromuscular irritability, increased deep tendon reflexes, and tetany. In hypocalcemia, Chvostek's and Trousseau's signs can be positive. Seizures can occur in severe hypocalcemia. Some have mood symptoms (depression, anxiety), alopecia, and nail and skin changes in hypocalcemia (2). Mrs . I had alopecia, mood changes, and isolated exaggeration of deep tendon reflexes. Chvostek's and Trousseau's signs were negative.

Further investigations were arranged to find the cause of hypocalcemia and it revealed that Mrs. I was having severe vitamin D deficiency. On the other hand, both low calcium levels and low levels of vitamin D are considered as reversible causes of dementia (3). Dementia is a clinical condition that is characterized by the disturbance of multiple higher cortical functions, including memory, calculation thinking, orientation, comprehension, learning capacity, judgment, and language. Consciousness is not impaired in dementia (1). Several reversible and irreversible causes contribute to the causation of dementia. In management, first of all, we have to detect and manage the reversible causes if there are any. We found hypocalcemia associated with severe vitamin D deficiency as a reversible cause of this patient, if we considered the clinical presentation as due to dementia. She did not come out with any memory impairment. But, Mrs. I showed some deficits in extended cognitive function and interestingly the defects were related to frontal lobe assessment. Mrs. I was not cooperative with the cognitive assessment at every time. So, we doubted whether this was frontotemporal dementia with comorbid vitamin D deficiency.

Vitamin D deficiency is a common problem in the whole world and it is labeled as a silent pandemic. The prevalence of it varies from 3% to 50% among global population (4). It is more prevalent in Asian countries. In Sri Lanka, it is nearly 48%. Middle East countries, even though there is enough sunlight, usually have minimum exposure to sunlight because of their cultural values. The prevalence of vitamin D in Middle East countries has risen to 70% (5). The relevance of that, in this case, is that Mrs. I had been working in Middle East countries for a long period. She used to stay inside the house most of the daytime and wear long dresses covering her whole body leading to minimum exposure to sunlight.

Several studies have been done to see the association of Vitamin D with cognitive impairment. Most have revealed that 25-hydroxy vitamin is associated with cognitive impairment. One study mentioned that neurotrophic growth factor (NGF) and brain-derived growth factor (BDGF) are two of the gene products that have specific relevance to cognitive and behavioral functions impacted by vitamin D (4,6,7,8).

There were some overlapping symptoms suggestive of behavioral changes seen in frontotemporal dementia in this patient. Frontotemporal dementia is an umbrella clinical term that encompasses a group of neurodegenerative diseases characterized by progressive deficits in behavior, executive function, or language.

Frontotemporal dementia is a common type of dementia, particularly in patients younger than 65 years. Frontotemporal dementia is considered the second most common cause of presenile dementia.

Frontotemporal dementia is characterized clinically by progressive deficits in behavior, language, and memory. Compared to most other dementias, cognitive impairment is a relatively minor feature. Behavioral, psychiatric, and linguistic aspects are more prominent. The disease can mimic many psychiatric disorders because of the prominent behavioral features. There are two major subtypes of frontotemporal dementia. Those are behavioral-variant frontotemporal dementia and primary progressive aphasia. The primary progressive aphasia is then divided into semantic-variant and non-fluent variant forms (2,3,9).

There can be an insidious onset and slow progression of the disease. Early loss of insight, mental inflexibility, early signs of disinhibition, lack of judgment, stereotyped and imitative behavior, impulsivity, hyperorality, and distractibility are common behavioral features.

Echolalia, progressive decrease in speech output, and perseveration are considered as speech and language features. They can have apathy, depression, emotional blunting, and hypochondriasis as affective symptoms. Further, as physical symptoms, they can have early primitive reflexes, urinary incontinence, low/labile blood pressure, and late parkinsonism (2,3).

Though Mrs. I had distractibility and mood symptoms it was difficult to come to a definitive diagnosis at this

point as she lacked the other clinical features at this point and there is an obvious reversible cause for memory impairment which needs to be corrected.

Various underlying neuropathological entities lead to the frontotemporal dementia clinical phenotype and some of them were Pick's disease, frontal lobe degeneration of non-Alzheimer type, lobar atrophy, semantic dementia, Motor neuron disease with dementia, progressive non-fluent aphasia progressive aphasic syndrome and frontotemporal dementia with parkinsonism. All are characterized by the selective degeneration of the frontal and temporal cortices (3,9).

Genetics is an important risk factor for frontotemporal dementia. Advances in clinical, imaging, and molecular characterization have increased the accuracy of fronto-temporal dementia diagnosis, thus allowing for the accurate differentiation of these syndromes from psychiatric disorders. As the understanding of the molecular basis for frontotemporal dementia improves, rational therapies are beginning to emerge (3,9).

Structural brain imaging with MRI or CT shows focal, often asymmetrical, atrophy of the temporal and frontal poles. Behavioral symptoms are associated with the involvement of the right hemisphere and language symptoms are associated with the left hemisphere. Disproportionate hypometabolism and hypoperfusion in these regions can be seen in functional neuroimaging. Mrs. I's functional neuroimaging was suggestive of early changes in frontal atrophy.

The average survival of frontotemporal dementia is 6 to 11 years from symptom onset and about 2 to 6 years from diagnosis and patients with concurrent motor neuron disease have the worst prognosis.

At the moment, we kept the diagnosis open. We planned to reassess her after correcting her vitamin D levels. She is awaiting her endocrinology review in six months. Further liaison needed to be done with the surgical/ medical and endocrinology team after doing US-guided FNAC of her goiter.

This case highlighted the beauty and diversity of the clinical presentation and the importance of liaison work with other specialties and multidisciplinary teamwork with future management plans.

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