Diabetes, Metabolic Syndrome and Obesity

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CASE REPORT

Post COVID-19 Vertigo in a Patient with Hypothyroidism: A Case Report

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Case Summary: Female nurse, 44-years-old with a weight of 127 pounds. She attended our emergency clinic for an urgent care due to post COVID-19 vertigo and anxiety. Her problem began with severe, short-lived attacks of objective-circular type vertigo, accompanied by nausea and vomiting. The symptoms occurred when she assumed a lying position, turn right and sat or stood upright.

Interventions: The patient received medical prescription for hypothyroidism, vertigo and anxiety symptoms. Oral route feeding was started and was well tolerated.

Outcomes: The patient showed good evolution with the treatment. Currently, she is at home with daily intake of levothyroxine and losartan without complications.

Conclusion: The clinical case suggests that in patients with hypothyroidism, COVID-19 infection may trigger and exacerbate vertigo and anxiety.

Keywords: hypothyroidism, COVID-19, vertigo, thyroid

Introduction

The coronavirus disease 2019 (COVID-19) pandemic is currently one of the major health concerns worldwide. The disease not only affects the physical health of the patients, but also their body physiological activities and mental wellbeing. Dizziness has been a very common and one of the significant clinical manifestations reported in routine clinical practice in the patients with COVID-19. Hypothyroidism is the result of inadequate production of thyroid hormone (TH) or inadequate action of TH in target tissues,[1] and several studies have documented the increased prevalence of thyroid disorders in patients with diabetes or obesity,[2] due hypothyroidism is closely associated with increased serum total cholesterol (TC), low-density lipoprotein cholesterol (LDL-C) and triglyceride (TG), and multiple newly identified modulatory biomarkers, such as proprotein convertase subtilisin/kexin type 9 (PCSK9), angiopoietin-like protein (ANGPTLs), and fibroblast growth factors (FGFs), might play a role in modulating the risk of hyperlipidemia induced by this disorders.[3] It is also important to recognize that exists congenital hypothyroidism (CH) is defined as TH deficiency at birth due to insufficient stimulation by the pituitary of the thyroid gland,[4] and drugs that generate hypothyroidism by interaction in its treatment.[5] The thyroid gland has the capacity and holds the machinery to handle the iodine efficiently when the availability of iodine becomes scarce, as well as when iodine is available in excessive quantities,[6] in response to Thyroid Stimulating Hormone (TSH) release by the pituitary gland, a normally functioning thyroid gland will produce and secrete T_4, which is then converted through deiodination (by type I or type II 5′-deiodinases) into its active metabolite T_3. While T_4 is the major product secreted by the thyroid gland, T_3 exerts the majority of the physiological effects of the THs, and then, without sufficient quantities of circulating THs, symptoms of hypothyroidism begin to develop such as fatigue, increased heart rate, depression, dry skin and hair, muscle cramps, constipation, weight gain, memory impairment, and poor tolerance to cold temperatures. However; 150 microg iodine are

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daily required for TH synthesis, and the thyroid gland has intrinsic mechanisms that maintain normal thyroid function even in the presence of iodine excess.[7]

On the other hand, decompensated hypothyroidism is an endocrine emergency that commonly presents with altered mental status, as well as hypothermia, and depressed vital signs is a severe hypothyroid state, and is generally associated with multiple organ failure with the presence or absence of COVID-19, for this reason the clinicians should obtain a TSH and free thyroxine level when considering the diagnosis.[8] It so as to not miss this critical diagnosis.

Case Presentation

Assessment completed and documented by medical service of Neurology, Endocrinology, Psychology and Otolaryngology.

This is a case of female nurse, 44-years-old with a weight of 127 pounds. She lives with her 2 sons and mom in her own house. She attended our emergency clinic for an urgent care due to post COVID-19 vertigo and anxiety.

Clinical History

She was diagnosed of hypothyroidism 19 years ago, managed with levothyroxine with complete compliance to the treatment. At 40, she began with hypertension, which is being managed with Losartan, also with strict compliance to treatment. For some years now, she has been on active yoga practice, which she usually performs 3 days per week and does a five-mile running exercises around her neighborhood 4 days per week. In all these years, she had been feeling completely stable when doing the exercises and carrying out her daily routines. After suffering from a two-time COVID-19 infection, she continued with her routine activities without sensing any complications of the infection. She began with her present problem with a fall after a sudden wake up from sleep. Since then, she began with dizziness, nausea and loss of balance at night as well as anxiety.

Core Tips

Patients with hypothyroidism who developed post-covid-19 symptoms of vertigo/dizziness and anxiety that receive treatment medicine and appropriate nutritional support may have reduced manifestation of these symptoms and may not have the need to visit the hospital, even when their symptoms remain persistent.

Medical History

- Hypothyroidism for 19 years.
- Hypertension since 40-years-old.
- Anosmia (loss of smell) for 2 months
- Ageusia (loss of taste) for 6 months
- Body pain for 2 weeks
- Lung inflammation for 2 weeks
- Weight loss 3%
- Vertigo
- Anxiety

COVID-19 Vaccination Information

- SINOVAC first dose
- SINOVAC Second dose
- ASTRAZENECA third dose

Hypothyroidism Managements

Levothyroxine 100µg, once daily.

Hypertension Managements

Losartan 50mg, twice daily

COVID-19 Managements

Beclometasone spray 100µg, twice daily
Paracetamol 500mg for pain, 4 times daily as the need may be.
Omeprazole 20mg, twice daily
Amoxicillin 500mg, twice daily

Vertigo Managements

Difenidol 25mg, 3 times daily
Betahistine 24mg for lose of balance, twice daily as the need may be.

Anxiety Managements

Citalopram 20mg, 1 time daily for 45 days

Diet

Fish, chicken, eggs, olive oil, fruits, vegetables, Whole bread, juice of cactus (nopal) daily and cinnamon tea, lactose-free milk, sugar-free flavoring, corn, rice, beans. No-alcohol, No-smoking.

Review of Systems

Nocturia > 2 times every night

Physical Exam

Constitutional: Well-developed, well-nourished, irritable due to anxiety and vertigo
Vitals: BP: Supine – 130/91, 107; Sitting – 138/78, 107; Standing – 146/95, 115. BMI 21.0.
Head: Normocephalic / atraumatic.
CV: Regular rhythm, tachycardic, without murmurs, rubs, or gallops.
Respiratory: Clear to auscultation bilaterally.
EA: Normal bowel tones, non-tender, non-distended.
Musculoskeletal: UE Strength 5/5 throughout; LE strength 5/5 throughout and 5/5 at bilateral hip flexors. No knee joint laxity. Foot exam shows no calluses, ulcerations or deformities.
Neurology: Cognitive screening: Normal.
Tone/abnormal: No tremor, bradykinesia or rigidity. Sensation, proprioception and movements: DTRs normal.

Identified Fall Risk Factors

The results of the assessment tests indicate that her health is within normal limits.
She is taking levothyroxine and losartan every day.

Fall Prevention Plans

1. She was recommended making dose adjustment or reduction of her medication for vertigo.
2. She has to reassess her thyroid profile and avoid medications that cause falls.

Complementary Studies

Simple skull magnetic resonance of was normal.
Adrenal gland tumor assay was normal.

Relevance of This Case

This case shows the importance of psychological support to the population after undergoing certain health images that would help them to implement quick coping strategies.

Results

There are several different test that can measure thyroid function and are blood test used to measure the health of thyroid.

The results of thyroid blood tests (tables 1, 2, 3 and 4), were made in a Laboratory accredited by College of American Pathologists (CAP), and are described in a reference range of values. The reference range has a high and low value

Table 1 Thyroid Profile

Sex: Female; Age: 44 years	**Values**	**Range**
Immunology Assay		
TSH (Thyroid Stimulant Hormone)	0.538 μUI/mL	[0.270–4.200] μUI/mL
T^3 TOTAL (Triiodothyronine)	0.68 * ng/mL Low	[0.80–2.00] ng/mL
T^3 (Triiodothyronine Free)	1.77 * pg/mL Low	[2.00–4.40] pg/mL
T^4 TOTAL (Thyroxine)	6.69 μg/dL	[4.50–12.00] μg/dL
T^4 (Thyroxine Free)	1.26 ng/dL	[0.93–1.70] ng/dL
Method: electrochemiluminescence		
Cobas 8000 – Roche		Sample: serum

Notes: *Low values T^3 total and $T^{3.}$

Table 2 Blood Assay

Assay	**Values**	**Range**
Glucose	74 mg/dL	70–99 mg/dL
Cholesterol	190 mg/dL	100–240 mg/dL
Triglycerides	78 mg/dL	0–149 mg/dL
Ultra HDL	54 mg/dL	40–60 mg/dL

Table 3 New Cellular Assay

	Values	**Range**
Erythrocytes	5.0 × 10^6μL	4.08–5.5 10^6μL
Hemoglobin	15.2 g/dL	13.0–16.6 g/dL
Hematocrit	45.1%	38.1–48.8%
Creatinine	0.62 mg/dL	0.6–1.2 mg/dL
Glucose	89 mg/dL	70–99 mg/dL
Urea	23.75 mg/dL	15–53.5 mg/dL
Leukocytes	4.3 × 10^3μL	3.9–10.1 10^3μL
Lymphocytes	1.92 × 10^3μL	0.8–3.3 10^3μL
Monocytes	0.26 × 10^3μL **Low**	0.3–0.9 10^3μL
Neutrophils	1.92 × 10^3μL **Low**	2.0–7.2 10^3μL

(*Continued*)

Table 3 (Continued).

	Values	Range
Eosinophils	0.17 × 10^3µL	0.0–0.5 10^3µL
Basophils	0.3 × 10^3µL	0.0–0.1 10^3µL
Platelets	325 × 10^3µL	147–402 10^3µL
Aldosterone/renin	3.9	1.5–11
Serum aldosterone	6.8 ng/dL	1.0–16 ng/dL
Renin (Activity)	1.76 ng/mL/hr	0.6–4.18 ng/mL/hr
Uranie normetanephrine	80.91 µg/24 hr	< 527 µg/24 hr
Bilirubin	0.9 mg/dL	0.3–1.0 mg/dL
AST/ALT	1.09 **High**	<1.0
Albumin/Globulin	1.32	1–2.5

Abbreviations: AST, Aspartate aminotransferase, ALT, alanine aminotransferase.

Table 4 Serum Electrolytes Level

	Value	Range
Sodium	140 mmol/L	136–145 mmol/L
Chloride	105.6 mmol/L	98–107 mmol/L
Calcium	9.56 mg/dL	8.6–10.3 mg/dL
Phosphorus	3.62 mg/dL	2.5–5 mg/dL
Magnesium	2.03 mg/dL	1.9–2.7 mg/dL

Abbreviation: Laboratory accredited by College of American Pathologists (CAP).

between which results are considered normal. Values near the upper or lower limit are mark with (*), Low or High word ´s, while anything outside of these limits is considered abnormal. Monocytes and Neutrophils showed values of lower limit and AST/ALT upper limit, respect normal values.

Discussion

THs have various effects on the body, which include electrolyte and water hemostasis. It is also involved in renal development and physiology, because hyponatremia is a serious electrolyte imbalance that can be associated with the involvement of different body systems and a wide range of deleterious changes.[9] In the present case, the authors reported a female with the symptoms of severe hyponatremia and serum sodium level of 110 meq/l. This report may justify the appearance of hypothyroidism in the patient, because from a very young age, she had rigorously participated in several marathon races, as well as in 32km races organized in Mexico City. In view of these energetic exercise, she could not explain her new condition, although she had been exposing herself to severe dehydration. However, after being diagnosed with hypothyroidism, the patient was able to plan two pregnancies, and with clinical assistance, she received medical treatment and appropriate nutritional support, and has two completely healthy male children.

THs have a significant impact on heart function. It upregulates the expression of the sarcoplasmic reticulum calcium-activated ATPase. In a hypothyroid state, TH deficiency results in lower heart rate and weakening of myocardial

contraction and relaxation, with prolonged systolic and early diastolic times.[10] This could justify the appearance of hypertension in the patient at 40 years of age.

On the other hand, exposure to COVID-19 may exacerbate clinical disorders in which environmental, vascular factors, inflammation and oxidative damage are implicated in the homeostasis of the patients.[11] These disorders induce oxidative damage to metabolically compromised cells that may lead to Metabolic Syndrome (MetS). At worldwide level, the prevalence of MetS is increasing. This situation has led to notorious increase in the demand for natural food and nutraceuticals. Consequently, this promotes the production of these kind of foods, thus, making food-derived antioxidant peptides available for the consumption of both the healthy and patients. The resultant effect of this consumption is reduced production of reactive oxygen species and activation of endogenous antioxidant defense systems in body.[12] Food, such as legumes with different bioactive compounds, could reduce the risk of diabetic complications. Demand for leguminous products is growing, because of its low cost and robust contents of several health-promoting components, e.g., saponins.[13] Nopal (Opuntia spp.) is very noble plant that contains saponins, which greatly decrease excess glucose. It is by excellence the most utilized cactus in human nutrition.[14] In fact, patients receiving antioxidant supplementation have reduced markers of burn stress-induced inflammation, decreased hypermetabolic response, and shorter length of hospital stay.[15] Patients with hypothyroidism who developed post-COVID-19 symptoms of vertigo/dizziness and anxiety that receive treatment medicine and appropriate nutritional support may have reduced manifestation of these symptoms and may not have the need to visit the hospital even when their symptoms remain persistent, in addition, the results of thyroid blood tests (Tables 1, 2, 3 and 4) generally each hormone or biomarkers should fall within a reference range that was considered normal.

Conclusion

The results of the present clinical case bring into evidence the combined beneficial effects of psychological, clinical and appropriate nutritional support to patients with hypothyroidism and post COVID-19 symptoms. Invariably, this will help to optimize the management of both the rare and common post-COVID-19 clinical manifestations that are the major complaint of people who had suffered this infection.

Abbreviations

COVID-19, Coronavirus disease 2019; AST, Aspartate aminotransferase; ALT, Alanine aminotransferase; BMI, Body Mass Index; CV, Cardiac Values; EA, Examination of Abdomen; UE, Upper Extremity; LE, Lower Extremity; DTRs, Deep Tendon Reflexes.

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Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

Consent for Publication

A written consent was obtained from the participants´ parents because decision-taking was outrightly delegated by the patient to a family member or competent person, who in this case, was the parents. Besides, Ethics Committee of National Institute of Pediatrics approved the publication of case details.

Disclosure

The authors report no conflicts of interest in this work.

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