

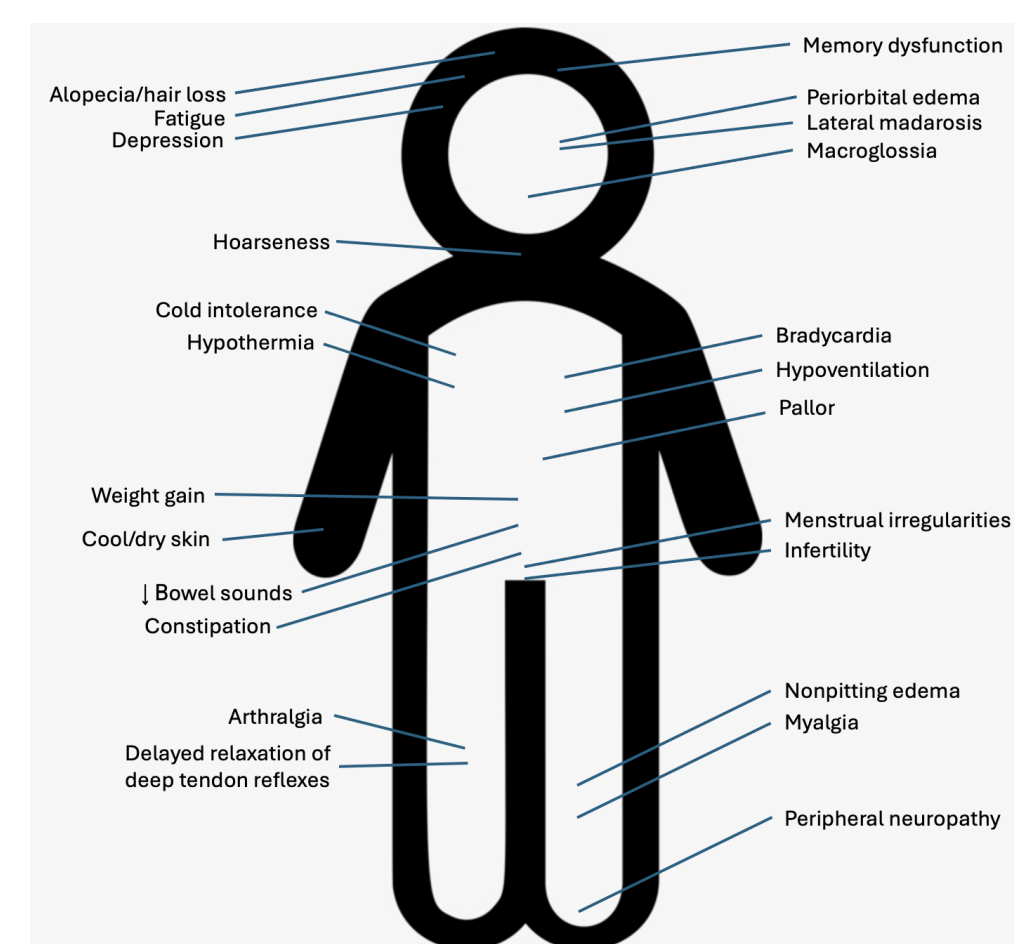
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INTRODUCTION

Hypothyroidism is the most common thyroid disorder, affecting over 5% of the general population worldwide.¹ Defined by high serum thyroid-stimulating hormone (TSH) and low thyroxine (T4) concentrations, hypothyroidism presents with a variety of symptoms related to thyroxine's extensive involvement in nuclear and cytoplasmic signaling pathways (See Figure 1). Less commonly appreciated is hypothyroidism's relationship with psychosis. Coined myxedema psychosis (MP), hallucinations and delusions occur in <2% of patients with hypothyroidism.² 26-37% of MP cases present without any classic signs or symptoms of hypothyroidism, essentially serving as the first manifestation of thyroid pathology.

This case describes the emergence of a paranoid, homicidal psychosis in the setting of previously undiagnosed chemoradiation-induced hypothyroidism which promptly responded to levothyroxine therapy.

Figure 1. Classic signs and symptoms of hypothyroidism



CASE PRESENTATION

Background

- 68-year-old Caucasian male escorted to ED by police after discharging firearm at home in response to audiovisual hallucinations
- Past medical history: cT3N2c hypopharyngeal SCC 1.5 months s/p 5 weeks cisplatin chemotherapy and 70 Gy neck radiotherapy
- Psychiatric history: Major Depressive Disorder established 5 months prior to presentation, managed with venlafaxine 37.5 mg BID

Exam

Vitals: hypertensive

Physical exam: unremarkable

Psychiatric interview:

- Appearance: disheveled
- Attention: impaired
- Orientation: person, situation
- Mood: depressed, anxious, frightened
- Affect: congruent
- Speech: soft, latent, intermittently muddled
- Thought process: disorganized and circumstantial
- Delusions: paranoid, reference
- Hallucinations: auditory and visual
- Memory: poor recent and remote
- Insight/judgement: poor
- Cognition: impaired

Labs and Imaging

| | |
|------------------------------|-----------------------------------|
| Complete blood count | Mild anemia and thrombocytopenia |
| Chemistry | Mild hyponatremia |
| Urinalysis | Unremarkable |
| Urine drug screen | - |
| Sexually transmitted illness | - |
| Vitamin B and D | Unremarkable |
| TSH; free T4 | 115.05 μ IU/mL and 0.34 ng/dL |
| Head CT + Brain MRI | Chronic microvascular disease |

Initial Management

- Olanzapine 2.5 mg nightly
- Venlafaxine 75 mg in the morning

Hospital Course

- Hospital day (HD) #2: oral levothyroxine 100 mcg daily initiated
- HD#3: onset of abnormal involuntary movements of extremities and face concerning for seizure-like activity
 - EEG: continuous and symmetric background without abnormalities
 - Neurology consult: concerned for underlying alpha-synucleinopathy
- HD#4: TSH and free T4: 118.672 μ IU/mL and 0.35 ng/dL
 - Transitioned to IV levothyroxine
- HD#5: significantly diminished hyperkinesia noted
- Improvements to alertness and mentation continued in coming days while perceptual disturbances became infrequent and less bothersome
- HD#8: TSH and free T4: 112.67 μ IU/mL and 0.67 ng/dL
 - Transitioned back to oral levothyroxine
- HD#14: discharged home without residual signs of cognitive dysfunction or psychosis

DISCUSSION³

- MP may develop secondary to alterations in neurometabolic activity and monoaminergic messaging (See Figure 2)
- Mean TSH and free T4: 93 μ IU/mL [60-139 μ IU/mL] and 0.2 ng/dL [0.13-0.39 ng/dL]
- MP is highly responsive to levothyroxine therapy, with time to resolution frequently <2 weeks
- IV levothyroxine may expedite recovery compared to oral therapy
- MP frequently exhibits complete return to neurocognitive baseline post-treatment

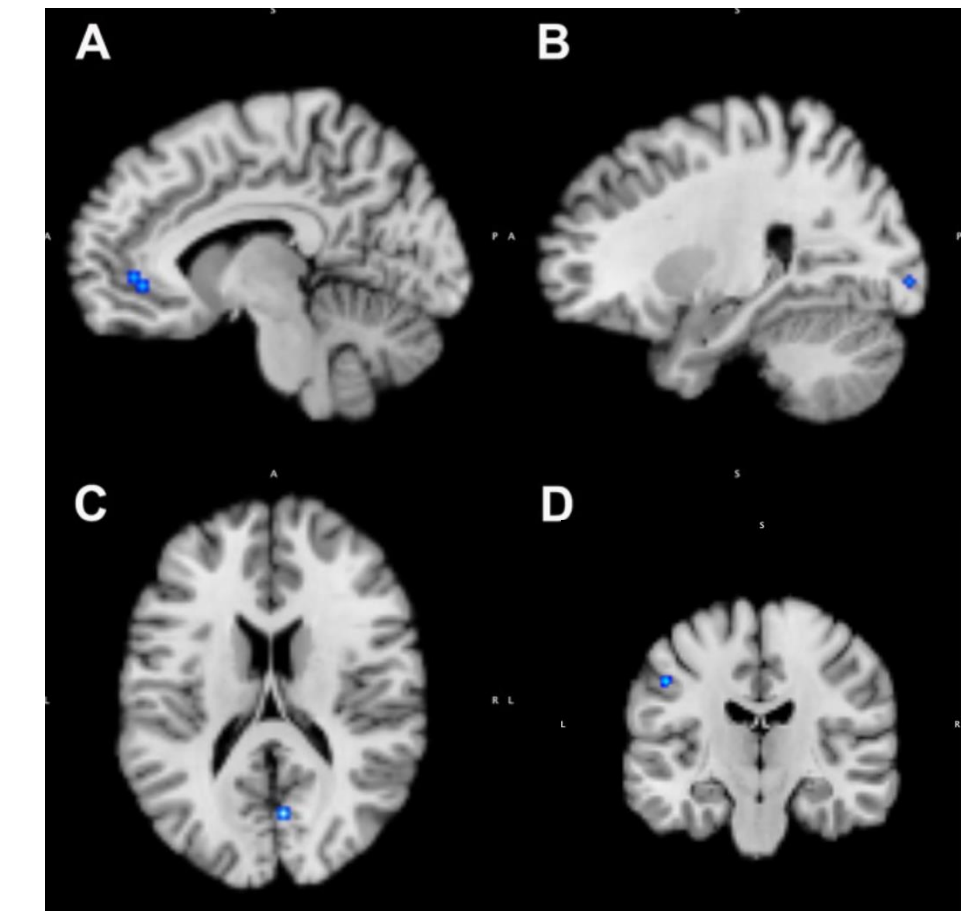


Figure 2. Decreased cerebral metabolic rate in hypothyroidism vs control. A. left anterior cingulate; B. right inferior occipital gyrus; C. right cuneus; D. left postcentral gyrus

CONCLUSIONS

- Despite wide variability in presentation and uncomplicated reversibility with levothyroxine therapy, validated diagnostic tools for MP are currently lacking.
- Easily missed in patients without a previous diagnosis of hypothyroidism, further research into MP is needed to better explicate its underpinnings and avoid future incidences of violence.

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Figure 2. Pak K, Kim M, Kim K, Kim BH, Kim SJ, Kim IJ. Cerebral glucose metabolism and Cerebral blood flow in thyroid dysfunction: An Activation Likelihood Estimation Meta-analysis. *Sci Rep.* 2020;10(1):1335. doi:10.1038/s41598-020-58255-5