Recurrent GI Symptoms and Altered Mental Status: Diagnostic Challenges of Gastrointestinal Beriberi, A Rare Presentation of Thiamine Deficiency

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Introduction

- Thiamine (vitamin B1) deficiency is classically associated with chronically nutritionally deficient states, such as alcohol use disorder
- This narrow view may delay diagnosis in well-nourished or overweight individuals
- Despite food fortification in the U.S., emerging research shows that thiamine deficiency is likely more widespread among populations not typically seen as at risk (often not malnourished, may be overweight or obese)[1]
- It is often under-recognized due to vague early symptoms that mimic other conditions. Because of these nonspecific early signs, more treatable stages are frequently overlooked.
- Gastrointestinal (GI) symptoms, such as nausea, vomiting, and abdominal pain, are increasingly recognized as early signs of deficiency. Although a gastrointestinal (GI) form of beriberi has been identified, it remains largely overlooked.[2]
- Cases of this primary GI syndrome are described in the literature. Symptoms like anorexia, nausea, vomiting, and abdominal pain are common.[2-6]
- These symptoms frequently bring patients to primary care and emergency settings, often without a clear etiology
- Diagnostic delays are common because classical signs like high-output heart failure (wet beriberi), neurologic syndromes (dry beriberi), and Wernicke encephalopathy (WE) often appear later
- Even then, WE's hallmark triad of confusion, ataxia, and ophthalmoplegia is present in only 16-33% of cases
- Though MRI can show characteristic brain changes, WE is ultimately a clinical diagnosis. Given thiamine's safety and the high stakes of missed treatment, early empiric therapy is recommended.[7,8]
- Pathophysiology of WE: Thiamine deficiency → decreased activity of TCA cycle & pentose phosphate pathway, increased oxidative stress, accumulation of toxic intermediates (lactate, alanine, glutamate), reduced cellular pH, disruption of homeostasis of cellular electrolytes → cytotoxic edema, astrocyte damage, BBB dysfunction → vasogenic edema[7,8]
- The key diagnostic challenge of thiamine deficiency is its simultaneous under-recognition and varied clinical presentation that typically does not resemble its classically described disease state[9]

Case Report: Patient Presentation

HPI: A 63-year-old female presented with the **chief complaint** of **nausea, vomiting, decreased oral intake, and abdominal pain**. Her family reported that she has had **ongoing daily vomiting for around a month** and was recently discharged from another hospital's ED after negative workup. Her symptoms persisted, and she developed abdominal pain, so she presented to our ED. She was admitted for further workup as the etiology of her symptoms was unclear.

PMHx:
- Type 2 Diabetes Mellitus
- Chronic Kidney Disease Stage 3b
- Peripheral Neuropathy
- Hypertension

PSHx:
- Cholecystectomy
- Hysterectomy

Meds:
- Norvasc 10 mg once daily
- Aspirin 81 mg once daily
- Flexeril 10 mg twice daily
- Folic Acid 1 mg once daily
- Zofran 4 mg three times daily
- Protonix 40 mg once daily
- Lyrica 100 mg twice daily
- Lopressor 100 mg twice daily

ROS: Negative unless noted in HPI

Social Hx:
- **No alcohol use.** Former smoker

Admission Day 1: Initial Physical Exam (PE)
- **Admission Vitals:** BP 132/80, HR 87, RR 20, SpO2 99%, Temp 97.8
- General appearance - no acute distress
- Mental status - **alert but responding slowly and minimally to questions (one or two words)**
- HEENT - oral mucosa moist
- Lungs - clear to auscultation
- Heart - normal rate, regular rhythm, normal S1, S2
- Abdomen - soft, nontender, nondistended, no masses or organomegaly
- Extremities - no pedal edema, no clubbing or cyanosis. **Bilateral lower extremity weakness**

Case Report: Evaluation & Management

Day 1: Initial Presentation
- **CC:** Chronic vomiting, abdominal pain
- **PE:** altered mental status, bilateral lower extremity weakness
- **Labs:** Lactic Acidosis
  - Lactic Acid, plasma 3.1 mmol/L → 2.4 mmol/L → 1.5 mmol/L
- Folate, B-12, TSH within normal limits
- **Imaging:** CT abdomen pelvis with contrast negative

Day 3: Initial Improvement
- Correction of labs
- **Improved mentation and abdominal pain: mental status at baseline, alert and oriented x4**
- GI consulted for abdominal pain- recommended supportive care with no plan for endoscopy in setting of improvement, negative CT

Day 5: Fall
- Patient had a fall while walking to bathroom and hit head
- CT head and cervical spine negative

Ongoing Diagnostics:
- **Day 12:** EEG b/l slowing of background activity, c/w metabolic, hypoxic encephalopathy and/or bilateral structural process
- **Day 13:** repeat CT head negative
- **Day 13: MRI brain with & without contrast (Figure 1):** This may represent acute infarcts or **Wernicke encephalopathy**

Days 6-17: Acute Encephalopathy of Unknown Etiology
- **Days 6-10:** Patient stopped responding to questions. Refusing labs, medications, food/drink. Patient opens eyes to verbal stimuli (saying her name), does not answer questions, does not follow commands, 3/5 strength in all four extremities. Psych initially consulted for behavior but all psychotropics were discontinued due to patient's somnolence.
- **Day 12:** Patient no longer responsive to verbal stimuli
- **Day 13:** Patient started on tube feeds. All medications were previously switched from oral to IV.
- **Day 14:** Patient no longer with tone in all four extremities

Day 14: Patient started on high dose IV Thiamine: 500 mg 3 times daily X 2 days followed by 250 mg once daily for 5 more days

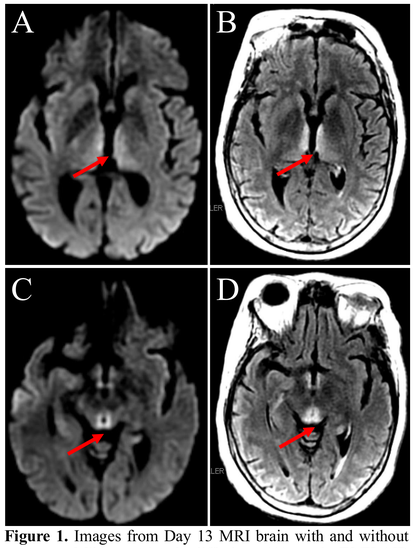

Figure 1. Images from Day 13 MRI brain with and without contrast. Mild restricted diffusion (A) and T2/FLAIR hyperintensity (B) in the bilateral medial and posterior thalami. Confluent restricted diffusion (C) and T2/FLAIR hyperintensity (D) around the periaqueductal gray.

Day 18: Neurology Consult

Consult placed to our neurology service (second opinion) for concern for metabolic encephalopathy vs stroke based on Day 13 MRI. Reviewed MRI with team, no evidence of stroke.

Days 18-25: Unchanged Neuro Exam
- Alert and oriented x 0. Nonverbal, moaning
- Non-responsive to verbal or painful stimuli
- Does not follow any commands, even one-step
- PERRL, EOMI, no facial asymmetry
- Demonstrates no blink response to threat
- Completely flaccid in all four extremities

Continued Diagnostics:
- **Day 18:** Lumbar puncture performed
  - Negative CSF studies (incl. NMDA receptor antibody, viral panel [West Nile virus, CMV, HSV 1 and 2, EBV, VZV], and VDRL)
  - Negative paraneoplastic panel
- **Day 20:** Long-term EEG negative
- **Day 21: Repeat MRI brain (Figure 2)**

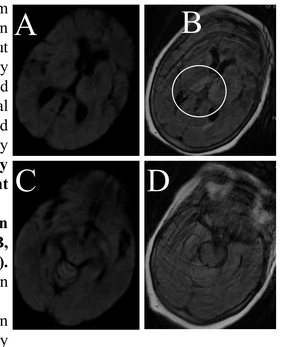

Figure 2. Images from Day 21 MRI brain with and without contrast. Previously seen restricted diffusion in bilateral thalami (A) and periaqueductal gray (C) **completely resolved. Persistent T2/FLAIR hyperintensity in bilateral thalami (B, white circle).** Previously seen T2/FLAIR hyperintensity in periaqueductal gray (D) **significantly improved.**

Days 21-25: Case Prognosis
- Repeat MRI showed some improvement but continued bilateral thalamic edema, which appeared irreversible, despite treatment with high dose IV thiamine
- The patient had no clinical improvement over two weeks, remaining severely encephalopathic
- Neurology and Medicine discussed the poor prognosis with patient's family, who opted for hospice. Patient expired in hospice care.

Final Impression:

GI beriberi and severe acute Wernicke encephalopathy secondary to thiamine deficiency in setting of chronic vomiting (excessive losses) and inadequate oral intake

Discussion

- Thiamine deficiency, though rarely considered, can manifest with GI symptoms like nausea, vomiting, abdominal pain, and lactic acidosis
- Prior case reports describe rapid resolution of both GI and neurologic symptoms following thiamine infusion in patients with chronic GI complaints and new neurologic findings[2-6]
- Earlier signs of neurologic involvement, such as altered mental status and gait instability, were initially attributed to other causes like lactic acidosis or overlooked due to temporary improvement, delaying the diagnosis of WE
- Retrospective chart review revealed years of recurrent hospital visits for vomiting without a clear cause. Notably, thiamine had been prescribed once before, though this detail was not available until after the patient's clinical deterioration. If recognized sooner, might have raised earlier clinical suspicion and prompted timely intervention.
- While high dose IV thiamine was started as soon as MRI revealed Wernicke encephalopathy, the patient's mental status had already been deteriorating for several days, and WE should be a clinical diagnosis. Thus, there should have been greater clinical suspicion for WE earlier in the patient's presentation.
- WE is reversible if treated with adequate doses of parenteral thiamine, preferably within the first 48-72 hours of symptom onset.[10] However, the vague and relapsing and remitting nature of her neurologic symptoms posed a diagnostic challenge.
- Another diagnostic challenge in GI beriberi is determining whether vomiting caused the deficiency or vice versa. Currently, thiamine is routinely given to patients with alcohol use disorder to prevent WE, but similar prophylaxis isn't standard for malnutrition associated with GI illness.[7]
- As this case illustrates, patients with altered mental status and chronic vomiting may be experiencing GI-related thiamine deficiency. Including chronic vomiting among recognized risk factors, alongside alcoholism, anorexia, and bariatric surgery, may increase diagnostic vigilance and prevent missed cases of WE.
- This case increases awareness of GI beriberi and represents an underrecognized presentation of a classic condition

Conclusion

- Diagnosing GI beriberi requires a high index of suspicion, especially in patients with **any history** of chronic malnutrition, even in the absence of alcohol use
- Clinicians should strongly consider thiamine deficiency in those with persistent GI or neurologic symptoms and/or lactic acidosis, particularly when standard workups are unrevealing or therapies ineffective
- Because GI beriberi is an under-recognized condition, and failure to quickly recognize and treat it can result in significant morbidity and mortality, providers should maintain a low threshold to initiate IV thiamine in such cases

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