A Diagnostic Conundrum: Malnutrition and Malabsorption Unravelling Hemochromatosis, Exocrine Pancreatic Insufficiency, Primary Biliary Cholangitis, and Probable Inflammatory Bowel Disease

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ABSTRACT

In this case report, a 45-year-old male was transferred to Oklahoma State University Medical Center from an outlying facility. Due to worsening acute kidney injury (AKI) following treatment for diabetic ketoacidosis (DKA) with associated foot ulcers. Upon arrival, patient appeared cachectic and lethargic. Initial lab work revealed worsening AKI, low prealbumin, and significantly elevated thyroid-stimulating hormone (TSH). Further investigation revealed multiple vitamin deficiencies. Patient required IV levothyroxine. Due to the concern for malnutrition and malabsorption, gastrointestinal (GI) etiologies were investigated.

Additional lab work revealed the patient could have had multiple gastrointestinal diagnoses: hemochromatosis, exocrine pancreatic insufficiency, primary biliary cholangitis, and possibly inflammatory bowel disease. Liver biopsy revealed iron deposition. Further invasive testing and procedures were recommended to guide treatment.

Ultimately, patient's clinical status declined throughout the rest of the hospitalization. The patient's family ultimately pursued comfort measures only (CMO) and he subsequently passed away before confirmatory testing could occur.

INTRODUCTION

Learning objectives:

1. Elaborate on pathophysiology of hemochromatosis
2. Discuss the sensitivities and specificities of the significant labs ordered during hospitalization and role they play
3. Discuss how hypothyroidism can be manifested from malabsorption

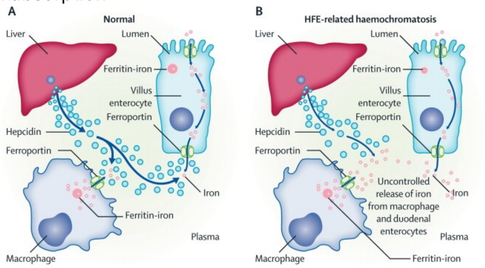

Figure 1: Diagram of the pathophysiology of hemochromatosis

CASE PRESENTATION

Background: 45-year-old male who presented to OSU Medical Center from an outlying facility where he was being treated for DKA and foot ulcers. Creatinine worsened from baseline of 1.9 to 3.25 which prompted transfer.

PMH: CKD stage 3, type-1 diabetes mellitus with associated neuropathy and chronic diabetic foot wounds bilaterally, PAD, history of dry gangrene of the glans penis with chronic suprapubic catheter placement, hypothyroidism, and chronic pain syndrome.

Hospitalization: Upon initial presentation in the intensive care unit (ICU), patient physically appeared to have a severe protein-calorie malnutrition. He was lethargic and had an acute metabolic encephalopathy. TSH was obtained due to the concern for myxedema coma. Prealbumin was low, TSH was significantly elevated with a decreased T4. Due to patient maintaining hemodynamic stability and not being hypothermic, less of a concern for myxedema coma. Patient's home Levothyroxine dose was converted to an IV equivalent. Transferred out of the ICU to the general medical floor.

Further investigation resulted in multiple vitamin deficiencies. GI workup was initiated. Per chart review, CT abdomen/pelvis w/o contrast in 2023 showed: Increased hepatic attenuation, which can be seen in the setting of metal deposition. As a part of his gastrointestinal workup, further analysis revealed:

- Anti-mitochondrial antibody – Positive
- Fecal calprotectin – Positive
- Fecal lactoferrin – Positive
- Fecal pancreatic elastase – <10 (severe insufficiency)
- Hemochromatosis PCR – Heterozygous for HFE Cys282Tyr

Interventional radiology performed a liver biopsy. Case was discussed with GI at Saint Francis Hospital about iron chelation initiation; recommended EGD and colonoscopy with biopsies for confirmatory testing.

Developed significant coagulopathy and hemodynamic instability, prompting transfer to ICU. Due to new clinical state, patient was made CMO by family and passed away prior to procedural evaluation.

LAB WORK/IMAGING/PROCEDURES

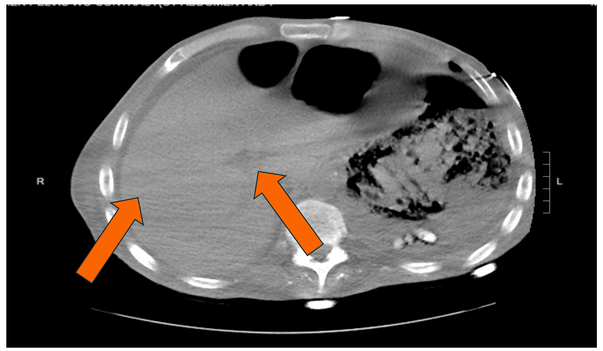

Figure 2: CT abd/pel w/o contrast showing hepatic attenuation with possible metal deposition

Lab	Value with range
Vitamin A	0.19 (0.13 – 1.20)
Vitamin B3 (Niacin)	None detected
Vitamin C	<0.1 (0.2– 2.1)
Vitamin D	4.4 (30 – 96)
INR	2.78 (<1.12)
TSH	196.80 (0.35 – 5.0)
Prealbumin	10 (17-42)
Iron Saturation	118.5% (15 – 55%)

Table 1: Labs obtained during hospitalization with their accompanying range related to patient's clinical scenario

Liver biopsy:

- 2+ hepatocyte iron deposition

	Sensitivity	Specificity
Anti-mitochondrial antibody	84.5%	97.8%
Fecal calprotectin	93%	96%
Fecal lactoferrin	78%	90%
Fecal pancreatic elastase	77%	88%
Hemochromatosis genetic testing	98.5%	99.5%

Table 2: Sensitivities and specificities of GI specific testing

DISCUSSION/CONCLUSION

Hypothyroidism and Malabsorption

- Synthroid is a fat-soluble medication primarily absorbed in the small intestine. Conditions, like IBD, can cause inflammation leading to increased gut permeability, changes in the gut's pH, and electrolyte imbalances
- Failure to absorb could also come from lack of solubility from exocrine pancreas as fat-soluble vitamins are unable to be absorbed
- Additionally, the pancreas has thyroid receptors, so if thyroid is underactive then the pancreas is not getting stimulated to release amylase/lipase and bicarbonate, thus causing exocrine pancreatic insufficiency itself
- Could the patient's hemochromatosis infiltrated into the pancreas?

Heterozygous hemochromatosis

- Genetic testing revealed heterozygous mutation in HFE C282Y gene
- Different populations vary the degree of phenotypic expression of heterozygote hemochromatosis with only the C282Y allele from 1.5% to 16.4%

Severe malabsorption in this patient revealed an underlying complex combination of genetic and autoimmune gastrointestinal disorders. His numerous conditions could have led to fat- and water-soluble vitamins can lead to significant immune, neurologic, hematologic, and musculoskeletal complications. This case highlights the complexity of diagnosing overlapping metabolic, endocrine, and hepatic disorders.

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