College of Human Medicine
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PRN Dapsone-Induced Methemoglobinemia in a Patient with Celiac Disease: An Uncommon Cause of Acute Hypoxia

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Introduction

Dapsone is first-line treatment for dermatitis herpetiformis secondary to celiac disease. The metabolism of Dapsone generates dapsone hydroxylamine which oxidizes ferrous hemoglobin to ferric hemoglobin increasing the risk for methemoglobinemia as a consequence.[1]

Case Description

This case involves a 57-year-old male with a history of heart failure with recovered ejection fraction and celiac disease who presented to the emergency department (ED) with worsening acute on chronic dyspnea. He denied chest pain, leg pain, upper respiratory symptoms, history of deep vein thrombosis/pulmonary embolism, chronic obstructive pulmonary disease, or smoking. The physical exam revealed that he was euvolemic.

He was hypoxic upon arrival to the ED with saturations between 85-87% which did not significantly improve on 6 L nasal cannula. He was otherwise hemodynamically stable. Arterial blood gas (ABG) showed a pO2 of 132.5 mmHg with a measured oxygen saturation of 80%. Methemoglobin levels were elevated at 16.4%. Upon further questioning, the patient stated that he takes Dapsone PRN and took 6 100 mg tablets 3 days prior to his presentation to the ED in anticipation of consuming gluten. Glucose 6-Phosphate Dehydrogenase (G6PD) activity was within normal limits and the patient was given 1 mg/kg of methylene blue.

Over the next day he had significant improvement in his dyspnea and was weaned to room air and later discharged home without complaints.

Clinical Image

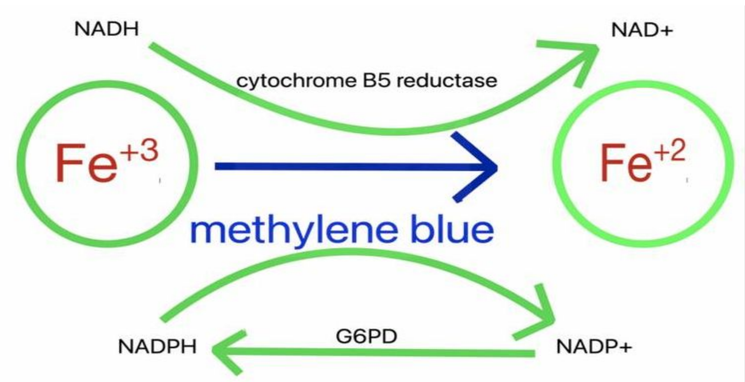

Figure 1: Methylene blue mechanism of action[2]

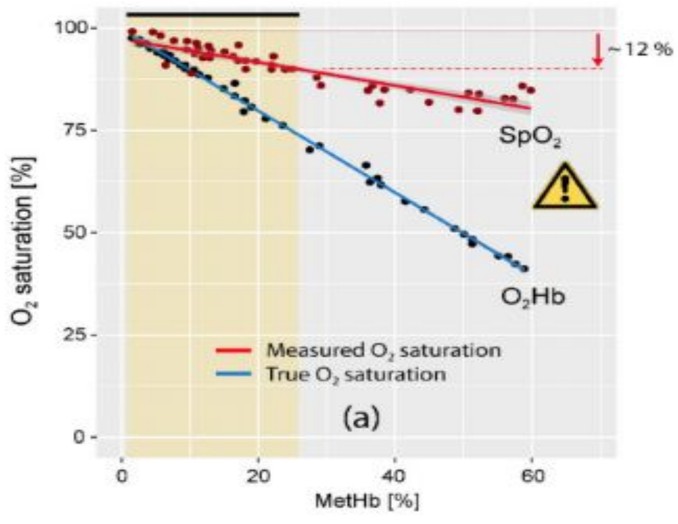

Figure 2: Methemoglobin's impact on oxygen saturation measured with pulse oximetry[3]

Discussion

This case is unique for the rare presentation of acute symptomatic methemoglobinemia in the absence of G6PD deficiency, renal impairment, cyanosis or hemodynamic instability.

Exacerbation of congestive heart failure was a differential at the time of initial presentation given his history. However, the patient did not have crackles or JVD present and his BNP was within normal limits. Pulmonary embolism was considered due to the unremarkable physical exam despite hypoxia, but the computed tomography angiography of the thorax was negative and additionally ruled out pneumonia along with the absence of leukocytosis.

The clinical presentation highlights the classical saturation gap between pulse oximetry and ABG oxygen saturation emphasizing the utility of obtaining co-oximetry in patients with similar presentations to confirm the diagnosis of methemoglobinemia.[4] This case additionally reinforces the importance of asking the patient about all medications or over-the-counter medications they take as well as looking in the electronic medical record for fill histories.

References

1. Caproni M, Antigua E, Melani L, & Fabbri P. Guidelines for the diagnosis and treatment of dermatitis herpetiformis. *Journal of The European Academy of Dermatology and Venereology*. 2009; 23 (6): 633-638.
2. Idries IY, Khristoforov V, Duddala S, Duong, YV, & Zaman M. Out of the blue: Methemoglobinemia assxociated with the use of amyl nitrite in rush poppers for erectile stimulation. *Cureus*. 2023; 15 (6): E41201.
3. Scholkmann F, Restin T, Ferrari M, & Quaresima V. The role of methemoglobin and carboxyhemoglobin in COVID-19: A review. *Journal of Clinical Medicine*. 2020; 10 (1): 50.
4. Skold A, Cosco DL, & Klein R. Methemoglobinemia: Pathogenesis, diagnosis, and management. *Southern Medical Journal*. 2011; 104 (11): 756-761.