

Breathing Easy

By George Porfiris, MD, CCFP(EM)

A 35-year-old female presents to the emergency department with a chief complaint of trouble breathing for six hours. She also complains of lightheadedness and fatigue.

At triage, an astute nurse notices the patient looks a little cyanotic. Her oxygen saturation is measured at 84% to 85% on room air and she

is immediately placed in the resuscitation room.

Proceeding with the ABC's (airway, breathing, and circulation), she is put on 100% oxygen and given intravenous normal saline. She is placed on a monitor. Her heart rate is 130 beats per minute, her respiratory rate is 26 and her

blood pressure is 110/70 mmHg. She is afebrile.

As you are examining her, you notice that her oxygen saturation is still at 85%, despite 100% oxygen. Her chest is clear, with good and equal air entry, and her heart sounds are normal. The jugular venous pulse is normal and there is no swelling of her ankles. She does look a little cyanotic, but there is no clubbing. On further questioning, she reveals that she has no medical problems and has never had asthma or pneumonia. She has never smoked.

Practice pointer

One of the signs of methemoglobinemia is cyanosis which is unresponsive to oxygen treatment.

A blood gas will help confirm the diagnosis.

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What happened to the patient?



Case in Point

Table 1

Clues for methemoglobinemia presentation

- Cyanosis is unresponsive to oxygen.
- Blood is a chocolate-brown colour.
- Oxygen saturation is approximately 85%, despite 100% oxygen.
- Patient is on a known inciting agent.

Table 2

Most common drugs acting as exogenous oxidant stressors

- Pyridium
- Lidocaine/benzocaine
- Dapsone
- Nitrates
- Antibiotics: sulfa and nitrofurantoin


It has now been five minutes and her oxygen saturation is still 85%.

You happen to glance down at the chart and notice that in the medication section, it states she is on an antibiotic and “another pill.” She tells you that she has a urinary tract infection (UTI) and was put on the antibiotic and another pill to take away the discomfort five days ago. A bell goes off in your head as you discover that the antibiotic is macrobid and the second drug is pyridium. Pyridium is a urinary tract anesthetic used to treat the dysuria associated with UTIs. You decide to do a blood gas to confirm your diagnosis. The arterial blood gas (ABG) sample looks like chocolate milk. Upon seeing your ABG requisitions, you order measurements of methemoglobinemia and methemoglobin levels.

Many of the observations and exam results point to a diagnosis of methemoglobinemia

(Table 1). Methemoglobinemia results from the oxidation of the normal iron (Fe^{2+}) to its isomer Fe^{3+} . The oxidation is the result of the transformation of normal, oxygen-carrying hemoglobin into methemoglobin, which is unable to bind oxygen. This transformation usually occurs in susceptible individuals who

have been exposed to an exogenous oxidant stress—usually a drug (Table 2).

The treatment of choice is intravenous methylene blue, 2mg/kg. 

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In adolescents and adults, the most common side effects are throat irritation (2%), hoarseness/dysphonia (2%), headache (2%), and candidiasis (2%) which can be reduced by rinsing and gargling with water after inhalation; and palpitations ($\leq 1\%$). In children aged 4 to 11, the only adverse event with an incidence of $>2\%$ was candidiasis.

HPA-axis function and hematological status should be assessed periodically. Height should also be regularly monitored in children and adolescents receiving prolonged treatment with inhaled corticosteroids.

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