Methemoglobinemia — A Rare Complication after Lignocaine for Esophagogastroduodenoscopy

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Abstract

Topical pharyngeal anesthesia without conscious sedation is generally used as pre-medication for upper gastrointestinal endoscopy in India. Methemoglobinemia is an uncommon but a potentially fatal complication of the topical pharyngeal anesthesia. We report a case of methemoglobinemia, after a diagnostic esophagostroduodenoscopy. (J Dig Endosc 2010;1(3):151-2)

Key words: Methemoglobinemia - Topical pharyngeal anesthesia - Complication of upper GI endoscopy

Introduction

Methemoglobinemia is a rare but serious complication of topical pharyngeal anesthesia. It occurs when iron in hemoglobin is oxidized from ferrous to the ferric state, resulting in a hemoglobin molecule that is incapable of binding oxygen. It may occur either due to a genetic deficiency of methemoglobin reductase (enzyme that converts iron in hemoglobin from ferric to ferrous state), or more commonly, due to exposure to medications including dapsone, acetaminophen, benzocaine and nitrates.

Case report

A 48-year-old gentleman presented to us with intermittent diarrhea, vomiting and borborygmi for 1 year. He had lost 20 kilograms of weight. He was treated for tuberculous lymphadenitis of the cervical region for a period of 7 months and had noticed transient improvement. Laboratory tests revealed a normal blood sugar level, hypoalbuminemia (serum albumin: 2.5 gm%), and a negative serology for human immunodeficiency virus (HIV). Strongyloides larvae were detected in the stool and in biopsies from the stomach and duodenum. He was started on albendazole.

The barium meal follow through showed features consistent with Crohn’s disease, namely mucosal effacement, multiple sites of narrowing, asymmetric sacculations in the distal duodenum / proximal jejunum and a markedly contracted cecum. The patient was posted again for an endoscopy to take biopsies from the distal duodenum and jejunum. While awaiting the procedure, the patient’s pharynx was accidentally sprayed twice with 4% lignocaine. He had an uneventful procedure at 11 am. At 7 pm the patient complained of breathing difficulty and was noticed to have central cyanosis. The pulse oximeter showed a saturation of 81%. The patient progressively became drowsy and stuporose. He was intubated, ventilated and shifted to the intensive care unit. A disseminated strongyloidiasis infection, sepsis syndrome or an allergic phenomenon were considered. The patient was started on broad spectrum antibiotics and ivermectin.

In the intensive care unit, the arterial blood gas (ABG) showed pH = 7.433, pCO₂ = 23.1, PO₂ = 101, HCO₃ = 15.2, Base excess = -6.8, SaO₂ = 97.9. The saturation of 81%
seen on pulse oximetry did not improve with supplemental oxygen. The methemoglobin level was 33% as estimated by modification of Evelyn-Malloy method. The patient had not used dapsone, sulphonamide, nitroglycerine or acetaminophen. He was given commercially available, pre-sterilized IV methylene blue (2 mg/kg). Six hours later the methemoglobin level was undetectable.

**Discussion**

The benefit of topical pharyngeal anesthesia in an un-sedated patient undergoing upper GI endoscopy has not been adequately evaluated, while its use in a sedated patient is generally considered to be of marginal benefit. A recent meta-analysis on the subject demonstrated an improvement in the tolerability of upper gastrointestinal endoscopy with topical pharyngeal anesthesia. This conclusion is difficult to accept as the meta-analysis included heterogenous trials, especially with respect to sedative use, and majority of these trials showed no significant benefit with topical pharyngeal anesthesia. Further, the authors also warned against serious complications with topical pharyngeal anesthesia.

Methemoglobinemia is a rare but potentially fatal complication of topical pharyngeal anesthesia, with less than 50 case reports/series in world literature. Benzocaine is the most implicated agent while lignocaine is considered safer. Garvan et al in a large series of 28,478 patients, at the Mayo clinic reported the incidence of methemoglobinemia with topical benzocaine use to be 0.067%.

Various pathogenic processes may predispose to symptomatic methemoglobinemia – increased exposure and absorption of the implicated drug (topical anesthetic re-exposure, mucosal erosions and recent oropharyngeal instrumentation), increased oxidative stress (sepsis) and poor tolerance to methemoglobinemia (advanced age, hypoxia and anemia). The incidence of this complication therefore is higher among hospitalized patients. We suspect that oral mucosal disruption due to Crohn’s disease or recent upper gastrointestinal endoscopy and inadvertent anesthetic administration twice, contributed to the occurrence of methemoglobinemia in this patient.

Clinically, patients present with central cyanosis and symptoms related to tissue hypoxia, including shortness of breath and light headedness. Cyanosis is typically unresponsive to oxygen administration. If there is a difference between the measured oxyhemoglobin of the pulse oximeter and the calculated oxyhemoglobin of the arterial blood gas analysis (saturation gap), then methemoglobinemia should be suspected.

The clinical consequences of methemoglobinemia are related to the blood level of methemoglobin; dyspnea, nausea and tachycardia occur at methemoglobin levels of >30%, while lethargy, stupor and deteriorating consciousness occur as methemoglobin levels approach 55%. Higher levels may cause cardiac arrhythmias, circulatory failure and neurological depression, while levels of 70% are usually fatal. Symptomatic methemoglobinemia (methemoglobin level >30%), is treated by administration of methylene blue 1-2 mg/kg, parenterally over 5 minutes.

The mean delay in diagnosis after exposure in the Mayo series was 85±37 minutes and over 7 hours in our patient. As gastroscopy is an out-patient procedure, most patients leave hospital after the procedure. If the symptoms occur a few hours after the procedure as in the case reported, it could be fatal unless the patient is taken to the hospital early, the condition recognized and treated urgently. We therefore feel that it may be prudent to avoid topical pharyngeal anesthesia, a procedure with unknown benefit, at least in patients with multiple risk factors for methemoglobinemia.

**References**


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