

CASE REPORT: PEDIATRIC INTOXICATION INDUCING AFTER DENTAL PAIN MANAGEMENT OTC BENZOCAINE PRODUCT

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ABSTRACT

Local anesthetic systemic toxicity (LAST) is a life-threatening adverse event that may occur after the administration of local anesthetic drugs through a variety of routes. Increasing use of local anesthetic in various clinical practice makes contemporary understanding of LAST highly relevant. Methemoglobinemia is a rare disorder of the blood in which there is an increase in the proportion of hemoglobin present in the oxidized form (methemoglobin). It may be inherited, due either to a deficiency of methemoglobin reductase or to a structural abnormality of hemoglobin, or it may be acquired, usually secondary to exposure to drugs or chemicals that oxidize hemoglobin. Administration of some local anesthetics such as benzocaine at large doses may lead to an acute effect of risk Methemoglobinemia.

A 6-years-old child was suffering from dyspnea, headache, and grayish in appearance. The patient was self-treating with an over-the-counter topical oral benzocaine. Treatment; The diagnosis of methemoglobinemia was made in conjunction with consultation with a medical toxicologist, treatment with oxygen supply and methylene blue as antidote was given 1mg/kg of 1% solution intravenously over 7 minutes. The symptoms improved within 30 minutes and child felt markedly better within 1.5 hour.

This case report presents a contemporary perspective on the current state of understanding of LAST, including presentation and treatment. Methylene blue is the specific antidote, but should be reserved for more severe cases.

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INTRODUCTION

Exposure to some local anaesthetics (namely the ester-type local anaesthetics and principally benzocaine) can precipitate a change in the iron atom in the haemoglobin, specifically from a ferrous state to a ferric state to create a molecule called methaemoglobin. This is of concern as the ferric haemoglobin molecule has a much greater affinity for oxygen, so much so that the oxygen will not dissociate from the haemoglobin and therefore not be available for tissue and organ use. If an exposure causes enough haemoglobin to become methaemoglobin, the patient may experience signs and symptoms of hypoxemia such as cyanosis and shortness of breath. If this Definitive treatment for this emergency is the intravenous administration of methylene blue. FDA issued a safety communication warning health professionals and consumers that OTC benzocaine products should not be used in infants and children younger than 2 years and should only be used in adults and children older than 2 years. FDA also urged manufacturers to add warnings to their products' labels about benzocaine's potential to cause methemoglobinemia, a serious condition that changes the transport of oxygen to body tissues.(1). These products carry serious risks and provide little to no benefits for treating oral pain, due to the significant safety risk of methemoglobinemia blue lips and nail beds. Acquired methemoglobinemia is typically caused by oxidative stress and many prescribed medications are strongly associated with inducing methemoglobinemia e.g., Lidocaine, Metoclopramide, Prilocaine, Amyl nitrite, Nitroglycerin, Nitroprusside, sulfamethoxazole [2, 3]. A very common presentation of this cyanotic illness is after a medical procedure, such as endoscopy or bronchoscopy, during which a liberal amount of local anesthetic, such as benzocaine spray or gel is used [2,4,5]. The reported maximum dose before inducing methemoglobinemia would be 15mg per kilogram for a 50 kg person [6]. The pediatric medical emergencies occur quickly, without warning, and with possible severe consequences due to the child's under-developed physiology coupled with small oxygen reserves.

CASE PRESENTATION

A 6-year-old male brought by his mother to the outpatient of private polyclinic suffering from generalized weakness since the previous evening. He also reported dyspnea, headache, and dizziness, which started, and his mother noted his skin to be pale and grayish in appearance.

The patient also reported that he had a toothache for several days and was self-treating with an over-the-counter topical medication, Maximum Strength Orajel (benzocaine)). He stated he had been applying the gel three times per day for three days.

Physical examination revealed an alert, mildly distressed, cyanotic-appearing child. His vital signs revealed a temperature of 35 °C, heart rate of 72 beats per minute, blood pressure of 140/60mmHg, respirations at 18 breaths per minute, The child's skin displayed moderate pallor with perioral cyanosis. Upon initial venous blood draw, his blood had an abnormal chocolate-brown appearance (Figure 1). Laboratory studies revealed arterial blood measured pH, 7.32 (7.35–7.45); the total calculated hemoglobin, 16.3 g/dL; oxyhemoglobin, 70.9% (95.0–98.0); carboxyhemoglobin, 0.026% (0.5–1–5); methemoglobin, 28.4%. The diagnosis of methemoglobinemia and laboratory clinical analysis were done in conjunction with consultation of medical toxicologist at public poisoning center in pediatric teaching hospital, while pulse oximeter and blood pressure was used. The pulse oximeter monitors the child's pulse rate and the percent oxygenation of the blood. The emergency management was done with oxygen supply via mask and injectable methylene blue as antidote was given 1mg/kg of 1% solution intravenously over 7 minutes, indicated for symptomatic patients or methemoglobin levels greater than 25 to 30%. The symptoms improved within 30 minutes and child felt markedly better within 1-5 hour. The oxyhemoglobin at 94.5% and methemoglobin at 0.9%. After a 6-hour stay of nursing under observation and complete resolution of his signs and symptoms, child was discharged with the instruction to discontinue the use of the OTC Benzocaine's product and seek appropriate dental care.



Figure [1] Chocolate Blood Sample

DISCUSSION AND CONCLUSION

Methemoglobinemia is a hemoglobinopathy that can be induced methemoglobinemia due to the exposure to an oxidizing chemical or drug, leading to the removal of an electron from ferrous hemoglobin (Fe^{2+}) to create ferric hemoglobin (Fe^{3+}) at a rate that surpasses the endogenous reducing mechanisms, which primarily include the enzymatic activity of cytochrome b5 reductase and nicotinamide adenine dinucleotide (NADH) methemoglobin reductase [7,8]. The clinical manifestation of methemoglobinemia, %MetHgb Symptomology and chocolate-brown appearance of blood, metabolic acidosis and classic presentation of a patient with methemoglobinemia is dyspnea, pallor, grayish skin, cyanosis, and hypoxia were major assistance fast for the clinical diagnosis for poor facilities of available clinical laboratory in outpatient reception [9,10]. The consistency of oral gels contributes to potential overdosing inducing therapeutic error ends up with benzocaine methemoglobinemia intoxication [11]. If lidocaine topical anesthetic is used, it should be factored into the total administered dose of lidocaine as it can infiltrate into the vascular system. After buccal application, the patient should be observed for any possible toxic response as early recognition and intervention is the key to a successful outcome. While rare in adults, young children are more likely to experience toxic reactions because of their lower weight and immature physiology. Most adverse drug reactions occur within 5-10 minutes of injection. Local anesthetic toxicity is caused by high blood levels of anesthetic as a result of exceeding recommended local anesthetic dosages. Successful resolution of the emergency requires early recognition of the problem and swift definitive treatment.

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