



Potential diversion of local anesthetics from dental offices for use as cocaine adulterants

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Local anesthetics, with the exception of cocaine, are devoid of psychogenic properties and usually are not perceived to be drugs that can be abused.

However, several reports of methemoglobinemia coincident with cocaine administration have demonstrated the potential for the diversion of the commonly used topical anesthetic benzocaine as a cocaine adulterant.^{1,2} Analysis of a sample of the cocaine seized by the authorities revealed that lidocaine also is used as a cocaine adulterant.^{1,2} Adulterants are used not only to dilute illicit drugs to increase the profits of those who sell the drugs but also to give drug users the illusion that the drug is a more potent drug. For example, lidocaine and benzocaine increase the nasal numbness that accompanies snorting cocaine. When used properly, local anesthetics have a wide safety margin.^{1,2} Injectable lidocaine is the most frequently used local anesthetic in dentistry in the United States; it is estimated that approximately 640,000 to 800,000 cartridges of lidocaine are used daily (Paul Mondock, senior vice president of sales and marketing, Septodont, Lancaster, Pa., written communication, Aug. 14, 2013). In addition, benzocaine can be used safely as a topical over-the-counter agent.^{3,4} However, given the potential for local anesthetics to be used as drug adulterants, we suggest tighter surveillance of lidocaine cartridges and benzocaine gels in the dental office.

CASES

We conducted a PubMed search by using the following terms: “adulterants,” “benzocaine,” “cocaine,” “lidocaine” and “methemoglobinemia.” The following case illustrates the potential misuse of lidocaine and benzocaine as cocaine adulterants.

A 34-year-old man sought care for seizures at an

ABSTRACT

Background. Reports of lidocaine and benzocaine in the bloodstreams of people who abuse cocaine with accompanying reports of seizures and methemoglobinemia indicate that there is a potential that local anesthetics are being diverted from dental offices and being used as cocaine adulterants. These adulterants augment the nasal numbness produced by inhaling cocaine.

Methods. The authors conducted a PubMed search by using the following terms: “adulterants,” “benzocaine,” “cocaine,” “lidocaine” and “methemoglobinemia.”

Results. The authors identified two case reports as a result of their PubMed search. Each case involved a patient with symptoms of both cocaine overdose and methemoglobinemia who sought treatment at an emergency department. The results of urine samples from each patient, as well as the results from an analysis of a sample of one patient’s cocaine, revealed the presence of many adulterants, including lidocaine and benzocaine.

Conclusions. Injectable lidocaine and topical benzocaine are cheap and readily available substances found in dental offices that may be diverted by anyone—including dentists, office staff members or patients—to adulterate cocaine.

Practical Implications. Additional research is needed to identify whether dental offices are a common source of cocaine adulterants. The authors recommend that dentists keep track of their local anesthetic supplies.

Key Words. Lidocaine; drugs; drug abuse; drug contamination; drug interactions; pharmacology; local anesthetics; topical anesthetics; dental anesthetics. JADA 2014;145(3):256-259.

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emergency department (ED) in England while he was in police custody.¹ He had ingested a white powder, which he identified as cocaine, and admitted that the cocaine seemed more potent than usual. The patient had a history of epilepsy. He developed seizures within one hour of ingesting this batch of cocaine. The ED physician placed him under general anesthesia to control his seizures. His skin became cyanotic between seizure episodes. The ED physician obtained an arterial blood sample from the patient for arterial blood gas analysis. The blood was described as dark in color, with a partial pressure of oxygen in arterial blood (PaO₂) of 65.1 kilopascals and a fraction of oxygenated hemoglobin (FO₂Hb) of 82.5 percent (normal PaO₂, 11-13 kPa; normal FO₂Hb, 94-98 percent). The high arterial oxygen tension and low fraction of hemoglobin bound to oxygen are characteristic of methemoglobinemia. Co-oximetry testing confirmed a diagnosis of methemoglobinemia, because the methemoglobin (metHbO₂) level was 13.8 percent. Methylene blue was not administered to the patient because his metHbO₂ levels were below 20 percent. Urine mass spectrometry was used to identify the presence of not only cocaine but also phenytoin, lidocaine and benzocaine.

Another case of benzocaine-adulterated cocaine has been reported in the literature.² A 27-year-old man had attempted suicide by consuming a large quantity of cocaine. Noticing his altered mental status, his girlfriend called emergency services for help. The patient was having seizures and vomiting and was mydriatic and cyanotic by the time the paramedics arrived. His vital signs were documented as heart rate of 120 to 130 beats per minute, blood pressure of 220/130 millimeters of mercury and respiratory rate of 20 to 30 breaths per minute. Such dramatic increases in blood pressure, heart rate and respiratory rate and the onset of seizures are characteristic of cocaine intoxication. He arrived in the ED with a temperature of 38.3°C (100.9°F). The ED physician obtained an arterial blood sample from the patient for arterial blood gas analysis. The blood was described as chocolate brown; hemoglobin spectral analysis results helped confirm a diagnosis of methemoglobinemia, because the metHbO₂ level was 37 percent. Methylene blue was administered intravenously, and the patient was discharged from the hospital after six days. Urine mass spectrometry and gas chromatography testing were used to identify cocaine, norcocaine, ecognine (another cocaine metabolite) and benzocaine. The patient's girlfriend also gave the physician a plastic bag containing a white powder and claimed it was a "cutting" substance. This powder underwent mass-spectral analysis, which identified it as benzocaine.

DISCUSSION

These cases illustrate that the overall manifestation of a drug overdose may include not only the adverse effects of the illicit drug use but also the unintended adverse

effects from the adulterants and fillers. Illicit drugs, with the exception of abused prescription drugs, are produced under less-than-ideal conditions with no oversight or regulation, and the skills of the people who produce them are highly variable. To net a greater profit, producers often cut, or adulterate, illicit drugs with other substances. These cutting agents may be inert diluents or pharmacologically active adulterants.⁵⁻⁷ Pharmacologically inactive compounds or fillers such as sugars or starches can dilute the illicit drug, artificially increasing the volume and ultimately increasing profits.⁵⁻⁷ An adulterant, on the other hand, often is chosen as an adjunct to the illicit drug to enhance the drug's effects, giving adulteration of heroin with fentanyl. Both substances are opioids; however, the inclusion of fentanyl provides a more rapid onset of euphoria as the prodrug heroin is metabolized to morphine.⁸ Another example is adulterating cocaine with local anesthetics such as lidocaine or benzocaine. Cocaine is a local anesthetic, and the addition of lidocaine or benzocaine can give the drug user a more profound "freeze" or nasal numbness when the cocaine is snorted.^{6,7}

The results of analyses of samples of seized cocaine have shown that lidocaine is used as an adulterant more frequently than is benzocaine. Fucci and De Giovanni⁹ reported that the most common adulterant found in cocaine samples was lidocaine, followed by caffeine and aminophenazone. Results of an analysis of 2,824 cocaine samples showed that lidocaine was found in higher percentages than was benzocaine.¹⁰ In an analysis of 471 samples of seized cocaine, investigators found lidocaine in 128 samples and benzocaine in only two.⁷ Other pharmacologically active compounds found in the cocaine samples included but were not limited to phenacetin (an acetaminophen precursor), caffeine, diltiazem (a calcium channel blocker), levamisole (an anticancer drug) and hydroxyzine (an antihistamine).⁷ In another analysis of 343 cocaine samples, investigators detected the following adulterants: phenacetin (in 54 percent of the samples), caffeine (in 17 percent), acetaminophen (in 14 percent), diltiazem (in 11 percent), lidocaine (in 11 percent), levamisole (in 6 percent) and hydroxyzine (4 percent).¹¹ Although these drugs were seized in western Europe, it is possible that illicit drug producers in North America use similar adulterants. However, not all seized cocaine is analyzed for purity, nor are all the findings published in the literature.

Cocaine (benzoylecgonine) is an ester local anesthetic. Local anesthetic's effects are mediated by means of a sodium channel blockade.¹² A unique feature of cocaine that distinguishes it from other local anesthetics is that it has vasoconstrictive and sympathomimetic effects caused by means of inhibiting the reuptake of

ABBREVIATION KEY. ED: Emergency department.
MetHbO₂: Methemoglobin.

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