

Cocaine and Amphetamine Induced Cardiac Arrest-Case Report

Howard B Reinfeld*

Abstract

Amphetamines and cocaine belong to a family of medications known as stimulants, which increase the speed of neurotransmission in which the brain relays instructions to the rest of the body. Stimulants directly affect the central nervous system and boost metabolic rate, respiratory rate, blood pressure, and attention.

More briefly, stimulants are psychoactive agents that produce short-term enhancements in physical or mental performance and are commonly referred to as "uppers." To name a few, cocaine, ecstasy, and dexamphetamine are widely used stimulants while Ice (crystal methamphetamine) is the most powerful abusive stimulant substance.

Keywords: Cocaine; Amphetamine; Cardiac arrest.

Introduction

As with any drug, stimulants may be misused in a variety of ways. To use a stimulant substance, one can take a pill, snort a powder, inject themselves, or heat a crystal and smoke it. Stimulants that are injected or inhaled provide the strongest highs because they get to the brain more quickly. In comparison to injecting, the effects of snorting or eating stimulants are more gradual yet linger for far longer. Addicted people who regularly use stimulants may find themselves taking increasingly large doses in an effort to

recapture the first rush they once felt. Increased reliance on and addiction to the substance may ensue. A lethal overdose or interaction with another drug is a real possibility while consuming stimulants.

These stimulant drugs are used for a variety of medical conditions, including narcolepsy, obesity, attention deficit hyperactivity disorder (ADHD), and major depressive disorder. Long-term use of stimulant drugs impairs the dopamine system in the brain,

¹Cardiology Graduate of Mount Sinai Hospital Miami Beach Florida and Cardiologist at Private Practice, Howard B Reinfeld and Associates MD, PA and B.S Pharmacy, St. John's University, Jamaica, New York, USA

***Corresponding Author:** Howard B Reinfeld, Cardiology Graduate of Mount Sinai Hospital Miami Beach Florida and Cardiologist at Private Practice, Howard B Reinfeld and Associates MD, PA and B.S Pharmacy, St. John's University, Jamaica, New York, USA.

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reducing the individual's capacity to experience joy.

Amphetamine

Amphetamine is an FDA-approved stimulant of the central nervous system (CNS) used to treat attention deficit hyperactivity disorder (ADHD), obesity, and narcolepsy. As a stimulant of the central nervous system, amphetamine is highly addictive. Depending on the amount, it might make you feel euphoric and full of life. It increases specific types of brain activity, which leads to increased energy, attention, and confidence. Amphetamine was initially manufactured in Germany in the late 1800s, but its stimulating effects weren't identified until the 1930s when it was being used to treat nasal congestion.

Over time, people started using amphetamine for anything from alcohol withdrawal to cutting calories. It has also been used to treat narcolepsy, a disease in which patients experience abrupt sleep attacks, and attention deficit hyperactivity disorder in children and adolescents. As a last resort, it is used to help those suffering from depression.

Addiction and clinical use of amphetamine

Addiction

Amphetamine addiction can manifest in a wide variety of ways like other cocaine and other stimulants: they can be smoked, snorted, injected, or consumed orally. Amphetamine is commonly abused by students who take it in an unapproved manner to stay awake in class. These students believe that their increased energy and focus

from using the substance will help them succeed academically.

As was previously stated, amphetamine is highly addictive. The way this medicine affects the body has implications for how the brain functions. In particular, drugs like amphetamine may drastically change the brain's pleasure response by damaging pleasure receptors and reducing the body's natural capacity to experience pleasure.

People who abuse these substances often experience depression and even thoughts of suicide when they are not under the influence of the drug due to its destructive characteristics. Because of this, it might be challenging to overcome the urge to consume the substance.

Clinical use

Amphetamine is a stimulant of the central nervous system used to treat psychiatric diseases such as attention deficit hyperactivity disorder (ADHD), obesity, and narcolepsy.

Amphetamine-induced cardiac arrest

The increased heart rate and blood pressure, inflammation, and arterial spasms that amphetamines cause may all lead to heart attacks. Researchers at UT Southwestern Medical Center revealed that young individuals who misuse amphetamines may have an increased chance of having a heart attack [1].

Side effects

- Increased heart rate and blood pressure

- appetite suppression and weight reduction
- Insomnia
- Digestive upset
- Mood swings
- Aggression
- Paranoia and nervousness
- Auditory, visual, or tactile hallucinations

Treatment

Recognizing the existence of an issue is the first step in the healing process. After making the decision to address drug abuse, the next step is to seek professional assistance and emotional support.

Counseling is used as a behavior change method in many treatment regimens (talk therapy). The purpose is for you to learn about your habits and the reasons you use amphetamines. Support from loved ones during treatment can be invaluable in preventing relapse (relapsing).

Severe withdrawal symptoms may necessitate a longer stay in a residential treatment facility. Your well-being and security can be ensured while you rest there.

There is currently no medication that can inhibit the effects of amphetamines, which means that there is no way to help reduce amphetamine use through medication. Researchers, however, are exploring the possibility of developing such medicines.

Cocaine

Cocaine is an extremely addictive stimulant substance extracted from the leaves of the coca plant, which is native to South America.

To use cocaine recreationally is against the law despite its legitimate medicinal use.

Cocaine is a common abusive drug on the streets with the appearance of a fine, white crystal powder. Many street vendors cut it with fillers such as cornstarch, talcum powder, or flour to improve sales.

Cocaine may enhance performance on easy physical and mental tasks for some persons while having the reverse impact on others. Large doses of cocaine can lead to weird, unpredictable, and violent behavior.

The effects of cocaine are practically instantaneous and last for around an hour. The mode of administration determines the duration and intensity of the effects. When compared to snorting, injecting or inhaling cocaine results in a higher and more immediate rush that wears off far more quickly. The high from sniffing cocaine may last 15 to 30 minutes. The effects of smoking may only be felt for 5-10 minutes at most.

It is very perilous to mix cocaine with synthetic opioids such as amphetamine and have the users be unaware of the danger, they are putting themselves in. There is a possibility that this adulterated cocaine is contributing to a rise in the number of deaths from cocaine overdoses.

Addiction and clinical use of cocaine

Addiction

Cocaine abusers frequently engage in "overeating," or the practice of repeatedly ingesting the drug in a short period of time at ever-increasing amounts, in an effort to sustain their high. Dopamine is a natural chemical messenger that cocaine boosts in

brain circuits involved in the regulation of movement and reward.

To prevent further transmission of nerve impulses, dopamine normally returns to the cell from where it was produced. Cocaine, however, stops the recycling of dopamine, leading to a buildup of the neurotransmitter in the gap between nerve cells.

When dopamine is released in large quantities in the brain's reward circuit, it promotes drug use. The reward circuit may become less responsive to the drug with repeated use. Therefore, many try to achieve the same high and find respite from withdrawal by taking higher and more frequent doses.

Clinical use

However, cocaine still has medical benefits in the present day. Cocaine's primary pharmacological effect is to inhibit the reuptake of monoamine neurotransmitters, such as dopamine, norepinephrine, and serotonin. Reduced reuptake increases the activity of each of these receptors.

First, cocaine used topically is an anesthetic. It is utilized in nasal and lacrimal duct surgery. Cocaine inhibits sodium channels that are voltage gated. This prevents pain signals from reaching the brain, preventing the brain from feeling pain.

Lidocaine and procaine, which are likewise inhibitors of voltage-gated sodium channels, also function as anesthetics through the same mechanism. Before these chemicals were synthesized chemically, cocaine was utilized in a variety of surgical procedures. Cocaine can also be used to evaluate the pupillary

reactivity of an individual. It is very useful for evaluating the manifestation of Horner's syndrome. In Horner's syndrome, the sympathetic trunk that innervates a portion of the face is deficient. Consequently, a person with Horner's syndrome may have miosis, anhidrosis, or other pupillary reflex abnormalities. Horner's syndrome is frequently the outcome of a sympathetic trunk injury.

Side effects of cocaine

Cocaine usage has been found in multiple studies to increase HIV transmission. Studies have shown that cocaine has a negative effect on immune cell function and actually helps the HIV virus multiply. Studies have shown that coke users with HIV are at an increased risk of developing other infections, including the liver-damaging hepatitis C virus [2].

Cocaine has the following short-term health effects: excessive euphoria and energy, mental alertness, hypersensitivity to sight, hearing, and touch, and irritation. Cocaine usage also causes constricted blood vessels, dilated pupils, nausea, elevated body temperature, and blood pressure, as well as a rapid or irregular pulse.

Cocaine-induced cardiac arrest

Cocaine usage increases the risk of several heart problems, including myocardial infarction/cardiac arrest. Cocaine usage was associated with the clinical presentation in 48% of the young patients brought to the emergency room with non-traumatic chest discomfort [3]. As symptoms from cocaine usage might manifest up to 76 hours later, a thorough background is essential. Patients who abuse cocaine are more likely to be

smokers, which increase their risk of a heart attack [4].

In 6% of those brought to the ER due to problems from cocaine use, a diagnosis of MI was made due to an elevation in cardiac troponins. Acute myocardial infarction can occur from cocaine usage through a number of pathways, including increased sympathetic activity, coronary vasospasm, and hypercoagulability [5]. Atherosclerosis progression is also accelerated by chronic cocaine usage. The increasing incidence of false-positive creatinine kinase rise further complicates the diagnostic issue of confirming MI in these individuals.

Even in the absence of myocardial infarction, cocaine users are at risk of developing life-threatening arrhythmias such as ventricular tachycardia. Additionally, to myocardial infarction, cocaine usage has been linked to cardiomyopathy, tachyarrhythmia, and endocarditis.

Case study

36-year-old male with past medical history of cocaine use was brought by rescue after the patient has an episode of a cardiac arrest. The patient was given CPR by rescue before the arrival to the ER. EKG finding showed elevation in the anterior leads with sinus tachycardia of 114 bpm. STEMI alert was activated with IV fluids and critical care.

Cardiac Catheterization showed no evidence of coronary artery disease. This patient is a case of cardiac arrest induced by cocaine use. The patient expired shortly thereafter after close monitoring in the ICU.

Treatment

While there are no FDA-approved drugs for the treatment of cocaine use disorder, behavioral therapy can be highly useful in managing addiction and withdrawal symptoms.

Taking cocaine and amphetamine together

Cocaine and amphetamines are both first intended for medical purposes but can be highly addictive depending on the use (including ice). They both work by inhibiting the reuptake of dopamine, which is released from nerve terminals, and hence have comparable effects on mood, alertness, and behavior [6].

The difference between cocaine and amphetamines

Cocaine is obtained from the coca plant, which is native to the Andes Mountains and is where the drug is naturally produced. On the other hand, amphetamines are manufactured artificially and have properties that are analogous to those of ephedrine. Each of these medications is available in a variety of forms, and each of those forms has its own distinct characteristics and uses.

Cocaine and amphetamines both have very similar effects on the brain, and as a result, the people who use both substances tend to be very similar to one another. Both cocaine and amphetamines have the effect of elevating the levels of specific neurotransmitters that are circulating inside the brain.

When amphetamines are used, the neurotransmitters dopamine,

norepinephrine, and serotonin are all activated, leading to increased inactivity. Cocaine prevents the reuptake of specific neurotransmitters, most notably dopamine, which results in an increase in the levels of those neurotransmitters. In spite of the fact that the physiological effects of cocaine and amphetamine are almost identical, the effects of amphetamine can be felt for several hours, but the effects of cocaine often only last for an hour or less.

Throughout history, each medicine has been used for a variety of purposes. After being extracted from coca leaves, cocaine was initially utilized in the medical field as an anesthetic. Sigmund Freud advocated for the

effectiveness of cocaine as a treatment for depression and morphine dependence; however, as Freud became aware of the drug's adverse consequences, Freud no longer supported its use. During World War II, soldiers who were struggling with exhaustion were given amphetamines to help them.

Conclusion

In conclusion, these two substances have effects on the brain and body that are comparable to one another; nevertheless, in contrast to cocaine, amphetamines are regularly recommended in medical applications to help aid in the treatment of ADHD and other illnesses.

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