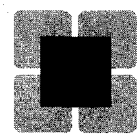

WILLIAM S. WILKE, MD, EDITOR

RECOGNITION AND TREATMENT OF COCAINE ABUSE

With the increasingly widespread use of cocaine comes the growing need to recognize the varied manifestations of cocaine toxicity.

The demographics of cocaine abuse have changed during the last decade. The typical cocaine user in 1983 was a white, 25- to 40-year-old man from a middle-income background. He had a college education and lived either in the Northeast or the West. By 1987, however, the profile had changed, thanks to lower cost and ease of preparation: Users are now younger, poorer, uneducated, unemployed, and live throughout the country. The reputation among users that the drug results in a great "high" has contributed to the increase in abuse.

Nationwide, 1 in 5 persons arrested for any crime is a hard-core (cocaine use at least once weekly) cocaine addict; in New York state, 1 in 40 persons is a hard-core cocaine user. A recently completed report by Senator Joseph Biden concluded that there are 2.2 million hard-core cocaine addicts in the United States.

Cocaine was first used for medical purposes by the Spanish in 1596. The white powder, cocaine hydrochloride, is derived from the evergreen, *Erythroxylon coca*. "Free base" cocaine is prepared by adding a solution to the acid form to generate an alkaline substance that can be smoked. "Crack" cocaine is an inexpensive alkaline derivative of cocaine hydrochloride that can be "cracked" off the main "rock" into smaller portions.

MECHANISM OF ACTION

Cocaine is metabolized by plasma and hepatic cholinesterases into inactive metabolites excreted in the urine. The local anesthetic effects of cocaine result from blockade of both initiation and conduction of nerve impulses. Central nervous system effects result from blockade of presynaptic reuptake of dopamine, norepinephrine, epinephrine, and serotonin. The same mechanism in the peripheral nervous system results in sympathetic overstimulation, manifested by tachycardia, hypertension, vasoconstriction, and tremor.

Intravenous and subcutaneous injection, inhalation via smoking, and snorting via the nostrils are the most common routes of administration. The rates of absorption vary, depending on the route of administration. For example, when cocaine is "snorted" and absorbed through the nasal mucous membranes, the onset of action takes 30 minutes and the effect lasts for 60 to 90 minutes. On the other hand, cocaine that is injected intravenously or smoked—and therefore absorbed through the pulmonary vascular bed—has its effect within 1 to 2 minutes, but the "high" lasts only 20 to 30 minutes.

CLINICAL CONSEQUENCES

Cocaine use has serious medical consequences. The route of administration, dosage, and time from use to onset of symptoms have no prognostic significance relating to the development of medical complications. Although chest pain is the most common symptom, many other complaints are described as the initial manifestation, often making diagnosis difficult.

The symptoms most commonly described by cocaine users who present to emergency departments are related to the cardiovascular (chest pain, shortness of breath) and neuropsychiatric (anxiety) systems. Cardiovascular complications have received the most attention in the literature; conditions that result from cocaine use include acute myocardial infarction (MI), angina pectoris, arrhythmias (generally wide-complex tachycardias, both ventricular and supraventricular), rupture of the ascending aorta, myocarditis, and dilated cardiomyopathy.

The mechanisms that cause acute myocardial infarction are speculative. The hypotheses include acute in situ thrombosis of a coronary artery, coronary vasospasm in a normal or diseased coronary artery, and sudden alteration in myocardial oxygen supply and demand due to an acute rise in blood pressure and heart rate. Although beta blockers have generally been recommended for early treatment of a cocaine-associated acute MI, recent data question this approach. Beta blocker therapy may potentiate the cocaine-induced fall in myocardial oxygen supply by further decreasing coronary sinus blood flow and increasing coronary vascular resistance. Further studies are needed to resolve this issue; in the meantime, beta blockers should be avoided in favor of other therapeutic

options, such as nitroglycerin and calcium channel blockers, for treatment of cocaine-associated MI.

Central nervous system effects include seizures and strokes. Seizures are most commonly tonic-clonic. Some investigators speculate that cocaine causes a decline in the seizure threshold. However, hyperpyrexia and acidemia may exacerbate the situation. Hemorrhagic and ischemic strokes have been described after cocaine use, regardless of the route of administration. Hypertension may predispose cocaine users to cerebrovascular accidents as a result of an acute rise in blood pressure. Other less common effects include migraine headache, acute dystonic reactions, and cerebral vasculitis (one case).

Cocaine hepatotoxicity has been documented in various animal models, but its existence in humans is speculative. This entity appears pathologically similar to acetaminophen toxicity, with zones of well-demarcated necrosis, mild hepatitis, and steatosis in surviving hepatocytes. The mechanism of its development is unknown, but is thought to be related to the production of a toxic free radical (norcocaine nitroxide).

Intestinal ischemia, or the "body packer syndrome," is a consequence of a smuggling tactic. Cocaine dealers wrap 5 to 7 grams of cocaine in individual latex packets. These are then ingested—as many as 180 at one time. If the packets rupture, a large bolus of cocaine is delivered to the gastrointestinal mucosa and causes vasospasm and ischemia. Deaths have been reported with this syndrome, and many believe that surgical removal is the only appropriate therapy.

The pulmonary effects of freebase cocaine smoking include pulmonary edema, pulmonary barotrauma from deep inspiration and prolonged Valsalva maneuver, pulmonary alveolar hemorrhage, hypersensitivity pneumonitis, and bronchiolitis obliterans. The mechanism of pulmonary edema is postulated to be a direct cocaine-mediated increase in pulmonary vascular permeability.

Among drug users with endocarditis, the frequency of cocaine use is 78%. The reasons for the relationship between cocaine and infective endocarditis are hypothetical and include frequency of use, methods of administration, differences in bacterial flora, and a direct effect of cocaine on the immune system. HIV infection and cocaine abuse has been well described in San Francisco, with an HIV seroprevalence of 35% in daily intravenous cocaine users.

One case of renal infarction has been reported in a 32-year-old man after intravenous injection of cocaine. A recent study identified 39 patients in whom acute rhabdomyolysis developed after cocaine use. Acute renal failure developed in one third of the group. This subset had a higher peak serum creatine kinase level. Severe hepatic dysfunction developed in most patients with renal failure.

Obstetrical complications of cocaine use have been well described and include preterm labor, spontaneous abortion, and abruptio placentae. Infants born to cocaine-using mothers are more likely to have intrauterine growth retardation, lower APGAR scores, congenital heart and genitourinary malformations, and neurobehavioral impairment.

Psychiatric manifestations of cocaine abuse vary depending on the amount and extent of use. Acute intoxication results in impaired judgment, impulsiveness, hypersexuality, and psychomotor agitation. A prolonged binge causes anxiety, irritability, panic, fear of impending death, paranoia, and delusions. With abstention, there is extreme exhaustion, intense depression, and hyperphagia. Withdrawal from cocaine is intense and requires a coordinated approach by trained physicians, counselors, and paraprofessionals.

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KEY STEPS IN EVALUATING THE DIZZY PATIENT

Because "dizziness" has different meanings to different people, a careful history is essential to accurately differentiate other forms of dizziness from vertigo, and to diagnose the cause. When a patient complains of dizziness, it is important to ask what he or she means by the symptom and then wait for the patient's answer, without suggesting any explanation. As a group, patients with dizziness tend to be suggestible; leading questions will produce a useless history. The patient who complains of