ToxTalks: Substances of Use and Misuse

Highlights from the Field

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Ketamine

This is a special edition dedicated to substance use & misuse. Look for more of these editions as we encounter emerging and growing concerns. Funding support provided by the CDC's Prescription Drug Overdose: Prevention for States program in partnership with the Virginia Department of Health.

Case Example

An 18 year-old university student was found "intoxicated" on a park bench. He was transported by EMS and failed to respond to 2 mg naloxone. On examination, his vitals showed: P 124 bpm, RR 12 bpm, BP 167/94 mmHg, and T 37.8^{o} C. He responded to tactile stimulation, but rapidly drifted back to sleep with shallow respirations. He had truncal ataxia and marked nystagmus on examination when the patient was stimulated enough to open his eyes and track. The remainder of his clinical examination was unremarkable. Laboratory tests were unremarkable except for hematuria.

Overview and Pharmacology

Ketamine is a phencyclidine (PCP) analog and dissociative anesthetic that is used both for medicinal and illicit recreational purposes. It is commonly used for procedural sedation, but recently there is a renewing interest in its use for pain control and for the treatment of depression. Ketamine's primary mechanism of action is though non-competitive agonism of the NMDA receptor. While ketamine abuse still represents a low percentage of recreational drug use, studies indicate a rise in in the number of emergency department visits related to its use.

Available Forms & Routes of Use

Ketamine can be found as a liquid, as a white crystalize powder, or in a tablet/capsule. The most common routes of exposure include ingestion, insufflation or via injection. The onset of activity depends

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of the route exposed, but typically it's within 10 minutes of exposure. The elimination half-life is approximately 2.3 hours. Street names include "Special K," "Vitamin K," "Super K" and "Ket," but street products may be adulterated with other drugs.

Clinical Effects

Typical clinical effects include agitation or central nervous system depression with paranoia and hallucinations common. Patients typically have an inebriated appearance with ataxia and can have horizontal, vertical or rotary nystagmus. Tremor, myoclonic movements and dyskinesias can occur. Ketamine is also a low potency biogenic amine reuptake inhibitor commonly resulting in tachycardia and hypertension with use. Like other hallucinogens, trauma with physical injury can occur while in the intoxicated state.

Treatment

Treatment of acute ketamine intoxication should initially focus on decreasing the neuropsychiatric stimulation if present. The patient should be placed in a calm quiet area, if possible. Benzodiazepines are typically first line therapy for sedation as needed. Tachycardia and hypertension generally improve as ketamine is metabolized. Compromised airway and/or respirations is less common, but may be encountered. Basic laboratory evaluation should be performed for symptomatic patients (e.g., electrolytes, BUN, creatinine, creatine kinase, urinalysis). Most hospital laboratories due not test specifically for ketamine, but on some urine screening assays it may cause a positive test for phencyclidine (PCP). Hydration with normal saline is appropriate.

Chronic Use

Chronic abuse of ketamine is associated with a urinary tract syndrome consisting of urinary urgency, frequency, dysuria and incontinence. Suprapubic pain and tenderness is common. Patients reporting symptoms are typically daily abusers of ketamine for weeks to months. There are also cases in the literature of urinary tract symptoms occurring in patients treated with ketamine for complex pain symptoms. The cause of this urinary tract injury is unknown but symptoms appear to be secondary to chronic inflammation of the urinary tract. Hematuria may occur in symptomatic patients and can be microscopic or macroscopic. Urinalysis reveals hematuria and pyuria that is sterile. Continued ketamine abuse will result in a decreased bladder compliance associated with fibrosis of the bladder wall and small bladder volumes. Computed tomography (CT) may reveal a thickened bladder wall with a small volume and perivesicular stranding. In these cases cystoscopy reveals bladder wall inflammation and

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ulceration. Injury to the upper urinary tract may also occur. Hydronephrosis can occur and renal papillary necrosis has been described.

Treatment of ketamine induced urinary tract dysfunction can be challenging. Being aware that this diagnosis exists in ketamine users essential. Ketamine induced urinary tract dysfunction should be on the differential diagnosis for patients exposed to ketamine presenting with urinary symptoms along with sterile hematuria and pyuria; particularly if a thickened bladder wall with perivesicular stranding is seen on CT scan. Abstaining from ketamine use is the mainstay of therapy and may resolve symptoms in those patients with mild disease. Bladder surgery may be necessary to alleviate symptoms in severe cases.

Blue Ridge Poison Center

For guidance treating patients with acute or chronic ketamine toxicity, call the poison center at 1-800-222-1222. Medical toxicology experts are standing by for free consultation 24-hours a day, every day.

Poison safety tips, free materials, & more: