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Authors

Chen, Iris E
Beckett, Katrina
Bahrami, Simin

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Ketamine-associated Cystitis: A Case Report

Chen IE, MD | Beckett K, MD | Bahrami S, MD

Author Affiliation: Department of Radiological Sciences, UCLA David Geffen School of Medicine

Corresponding Author: IC (iechen@mednet.ucla.edu)

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Abstract: Ketamine in subanesthetic doses became popular as a recreational drug for its strong, quickly achievable antidepressant effect and short-acting, well-tolerated psychotomimetic (hallucinogenic and dissociative) effect. Numerous cases of genitourinary system dysfunction associated with ketamine use have been reported. We describe a case of ketamine-use-related symptoms of genitourinary system dysfunction in a 23-year-old man who was found to have acute cystitis and a history of using ketamine. We also discuss the epidemiology, the clinical presentation, and some aspects of treatment of ketamine-associated urinary tract dysfunction. In patients with lower urinary tract symptoms of uropathy and a history of ketamine use, the possibility of ketamine-induced uropathy should be included in the differential diagnosis. Further studies are necessary to help delineate guidelines for both diagnosis and management of ketamine-induced lower urinary tract dysfunction.

Keywords: *ketamine, urinary, cystitis, bladder*

Case Presentation

A 23-year-old man with a history of ketamine use (1.5 grams daily for 8 days) presented to the emergency department with abdominal pain that continued for 2 days. The patient described the abdominal pain as right-sided, gradual onset, constant dull-achy pain, provoked by movement, and without alleviating factors. The patient reported discomfort when urinating as well as urinary frequency and urgency. The patient denied fever, chills, hematuria, nausea, vomiting, or diarrhea. Upon examination, the patient was found to have mild tachycardia but otherwise to be in a hemodynamically stable condition. The patient also had an enlarged, tender, and boggy prostate. Laboratory tests results showed no leukocytosis. Electrolytes were within normal limits. The results of urinalysis and urine culture test showed no abnormalities. The result of urine polymerase chain reaction (PCR) test was negative for *Chlamydia trachomatis* and *Neisseria*

Key Points

- Ketamine-associated urinary tract dysfunction should be considered in the differential diagnosis in a patient with lower urinary tract symptoms and a history of ketamine use.
- Management of ketamine-associated urinary tract dysfunction requires a multidisciplinary approach.

gonorrhoeae. Contrast-enhanced computed tomography (CT) of the abdomen and the pelvis showed mild urinary bladder wall thickening with diffuse mucosal hyperenhancement (Figure) suggestive of acute cystitis.

Discussion

Ketamine is an N-methyl-D-aspartate receptor antagonist originally developed as an anesthetic.¹

Soon after its first use in human and veterinary medicine, ketamine has become a popular recreational drug used for its psychotropic and psychotomimetic effects, including hallucinations, euphoria, and dissociation.¹

Multiple side effects of ketamine, including hypertension, tachycardia, respiratory depression, and psychosis, have been reported.¹ Complications of ketamine use often manifest as the symptoms of genitourinary system dysfunction.¹

Figure. Contrast-enhanced CT of Abdomen and Pelvis in a 23-year-old Man with an 8-day History of Ketamine Use.



Axial view (A) shows diffuse urinary bladder wall thickening (A, black arrow) with diffuse mucosal hyperenhancement. Coronal view (B) shows diffuse urinary bladder wall thickening (B, black arrow).

The effects of the drug on the lower urinary tract were first reported and confirmed on cystoscopy in 2007 as ketamine-associated ulcerative cystitis.² Since then, numerous cases of genitourinary system dysfunction, including reduced functional bladder capacity, hydronephrosis, urinary tract infection, and interstitial cystitis, associated with ketamine use have been reported.^{3,4,5,6} The mechanism of these impairments remains unclear, although histopathologic examination of the tissue removed by cystoscopic biopsy, have suggested that ketamine metabolites induce mild to severe infiltration of inflammatory cells into the urothelium.^{7,8} Ketamine has also been associated with higher levels of cytochrome c and specific caspases that induce apoptosis of urothelial cells.¹ The extent of inflammation of the bladder mucosa

in ketamine users has been associated with severity of clinical symptoms.⁷

Symptoms of uropathy were found in more than 25% of recreational ketamine users.^{5,9,10} Ketamine-associated urinary tract dysfunction should be considered in the differential diagnosis in a patient with lower urinary tract symptoms of uropathy in the absence of proven infection and neoplastic disease.¹¹ Since ketamine-induced uropathy was first described, a clinical staging system¹² has been proposed for assessment and treatment of patients with this disease.

Radiologic findings in patients with ketamine-induced cystitis may include a hypoechoic and thickened bladder wall on ultrasound and diffuse urinary bladder wall thickening with areas of hypodensity and perivesical inflammatory changes on CT (Figure).^{13,14}

Untreated ketamine-associated urothelial inflammation can lead to chronic pain and end-stage renal disease.^{8,15} Cessation of ketamine use and a combination of nonsteroidal anti-inflammatory drugs and anticholinergic medications could be effective in the treatment of lower urinary tract symptoms of uropathy associated with the use of ketamine.¹⁵ Management of this clinical entity requires a multidisciplinary approach to address both the urological and the psychosocial aspects associated with the drug use.¹ Further studies are necessary to help delineate guidelines for both diagnosis and management of ketamine-induced lower urinary tract dysfunction.

Author Contributions

Conceptualization, K.B and S.B.; Acquisition, analysis, interpretation of data, and writing – original draft preparation, I.E.C.; Review and editing, K.B and S.B.; Supervision, S.B. All authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. All authors had full access to all the data in the study and take responsibility for the integrity of the data and the accuracy of the data analysis.

Disclosures

None to report.

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