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Pathology Page

Pathological findings of ketamine ureteritis

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A 35-year-old man with a history of ketamine abuse for 2 years came to our outpatient clinic with dysuria and urinary frequency for 2 weeks. Acute urinary retention and gross hematuria occurred the next day after cystoscopy and hydrodistention of the bladder. He was admitted for blood clot evacuation under the impression of ketamine cystitis with blood clot tamponade in the bladder. He had repeated lower urinary tract symptoms and gross hematuria afterward. Six months later, an intravenous urogram performed for left flank pain showed left hydronephrosis and hydroureter with stenosis in the left distal ureter (Fig. 1). He underwent an ureteroscopic optic ureterotomy and placement of a double-J stent. A ureteroscopic biopsy from the left ureter was performed to exclude the possibility of a tumor.

The biopsy specimen from the left ureter consisted of two reddish-brown soft-tissue fragments measuring up to $0.9 \times 0.2 \times 0.1$ cm^3. Microscopic examination of the histologic sections revealed denudation of most of the overlying urothelium, with reactive regenerative changes in the residual urothelium that showed mildly hyperchromatic nuclei (Fig. 2). The regenerative epithelium stained positive for CK7 and negative for p53 on immunohistochemical stains. In addition, there was stromal edema, diffuse chronic inflammatory infiltration, and active granulation tissue in the subepithelial connective tissue. The granulation tissue also extended into the muscle layer. The inflammatory infiltrates were mainly composed of lymphocytes and only a few eosinophils. This morphology was compatible with ketamine ureteritis and negative for evidence of malignancy.

Chronic ketamine abuse is known to cause upper and lower urinary tract destruction [1–6]. Lower urinary tract symptoms occur in about 20–30% of ketamine abusers [4]. The pathological findings of ketamine-induced cystitis have been well-studied [5,6]; however, the pathology of ketamine-induced upper urinary tract damage is rarely reported [7,8]. We found a case report of chronic recreational ketamine abuse with renal failure which mentioned ureteral histologic findings with florid nephrogenic metaplasia and

Fig. 1. Intravenous urogram shows left hydronephrosis and hydroureter. The left distal ureter is narrowed.

Conflicts of interest: none.

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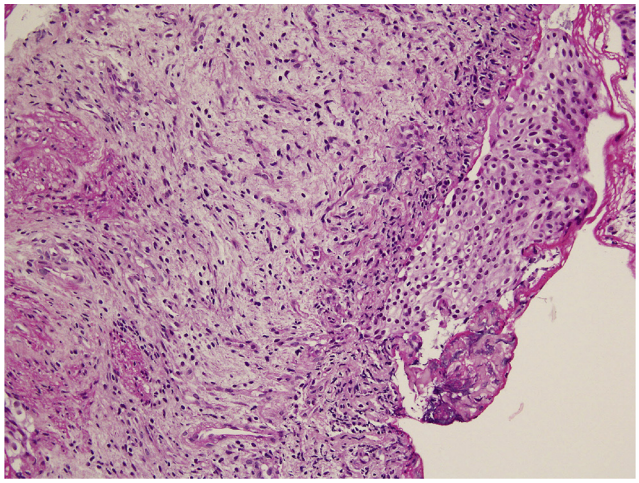

Fig. 2. Histological section from the left ureter (hematoxylin and eosin 200×) shows focal loss of the lining urothelium. The subepithelial connective tissue is edematous, with active proliferation of granulation tissue and some lymphocyte infiltration. The granulation tissue also extends into the muscle layer. The residual urothelium is reactive and mildly hyperchromatic.

focal intestinal metaplasia [7]. The authors of that study suggested that unusual ureteric metaplasia in a young person should raise the possibility of ketamine abuse. In a study by Lee et al [8], biopsy was performed during ureteroscopy on three of the nine patients with ketamine-related bilateral hydronephrosis, and the pathological findings showed ureteritis cystica and glandularis in one patient's ureteral specimen, inflammation with eosinophilia infiltration in another patient's ureteral specimen, and a fibroepithelial polyp in the third patient's specimen. A review of the literature revealed that eosinophils are usually present in the ureter or bladder tissue and show either prominent or scattered distribution [6–8]. In our case, the inflammatory infiltration was mainly composed of lymphocytes, with few eosinophils. No mucosal metaplasia or polypoid lesion was found.

We suggest that ketamine ureteritis should be included in the differential diagnosis of patients with a history of drug abuse presenting with symptoms and signs of ureteritis and ureter stenosis.

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