Urol Res (2008) 36:275–277
DOI 10.1007/s00240-008-0147-3

CASE REPORT

Acute renal failure due to bilateral ureteral stone impaction in an HIV-positive patient

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Received: 20 May 2008 / Accepted: 27 June 2008 / Published online: 17 July 2008

Abstract A 51-year-old HIV-positive man treated with atazanavir for 9 months presented with anuria following right flank pain. Laboratory examination indicated renal insufficiency, and abdominopelvic computed tomography scanning showed bilateral hydroureteronephrosis, but no stones were visualized. Endoscopic procedures were performed to investigate the causes of ureteral obstruction and, if possible, to insert Double-J stents in the ureters. A yellowish stone composed of pure atazanavir was found at the right ureteral orifice, and retrograde pyelography revealed a filling defect in the left ureter found to be caused by an atazanavir stone. The patient's renal function recovered after removal of these stones.

Keywords Acute renal failure · Atazanavir · Radiolucent stone · Urolithiasis

Introduction

Almost 100% of calculi are visible on helical computed tomography scanning (CT); the only known exception is stones formed from the protease inhibitor indinavir [1]. We report acute renal failure due to bilateral ureteral stone impaction in an HIV-positive patient, and it was not visualized in plain radiography or CT despite of the stone which consisted of indinavir.

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Case report

A 51-year-old HIV-positive man presented to the emergency room complaining of anuria following sudden pain in the right flank. The patient had been treated with highly active antiretroviral therapy consisting of atazanavir, ritonavir, lamivudine, and abacavir for 9 months. His HIV-RNA titer was undetectable and CD4+ cell count was low (284 cells/mm^3). Despite a history of urolithiasis more than 20 years ago, the patient's renal function was in the normal range (serum creatinine 0.8–0.9 mg/dl) when measured just before the onset of the current incident. At this present visit, laboratory examination revealed a high serum creatinine level (3.09 mg/dl), and urinalysis results showed microscopic hematuria (120 RBCs/high-power field) at pH 5.5. Plain radiography of the abdomen showed no calcification in the urinary tract. Furthermore, an abdominopelvic CT scan showed bilateral hydroureteronephrosis without any obstructive abnormality, including urolithiasis (Figs. 1, 2). On the assumption that the patient had bilateral ureteral strictures due to a malignant neoplasm, an endoscopic procedure was performed to attempt to insert Double-J stents. At the right ureteral orifice, a yellowish stone was found. Transurethral forceps were used to crumble this stone that was impacting the right ureteral orifice (Fig. 3). Before the stent was inserted in the left ureter, retrograde pyelography was conducted that showed a radiolucent filling defect of the ureter near the left orifice (Fig. 4). After the patient's renal function recovered, he underwent successful ureteroscopy for removal of a stone in the left ureter. Chromatography of the stone sample showed it to be comprised solely of pure atazanavir crystals (Fig. 5).

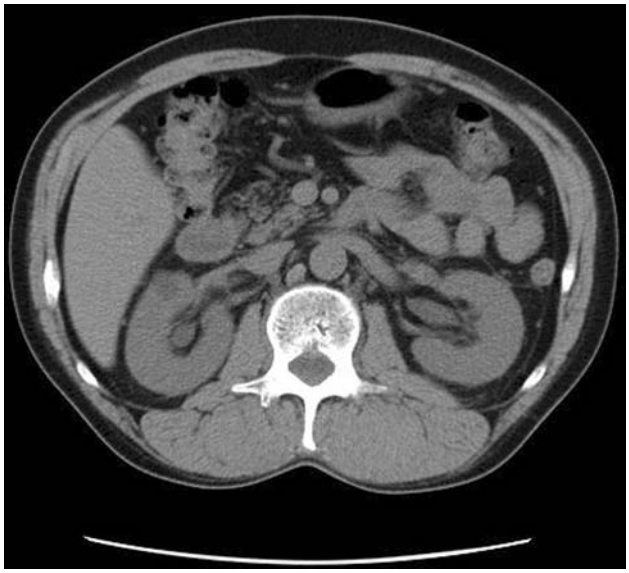

Fig. 1 Abdominopelvic computed tomography scan showing bilateral hydroureteronephrosis without obstructive abnormality, including urolithiasis

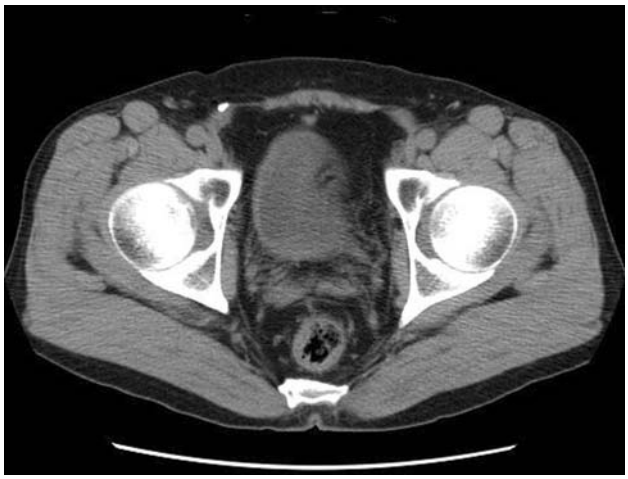

Fig. 2 No calculi were detected at the location of the impacted stone found on cystoscopy at the *right* ureteral orifice

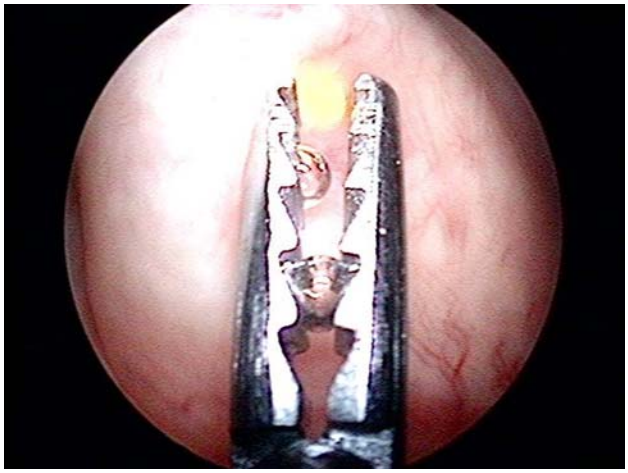

Fig. 3 Transurethral forceps crumbled a *yellowish* stone impacted at the *right* ureteral orifice

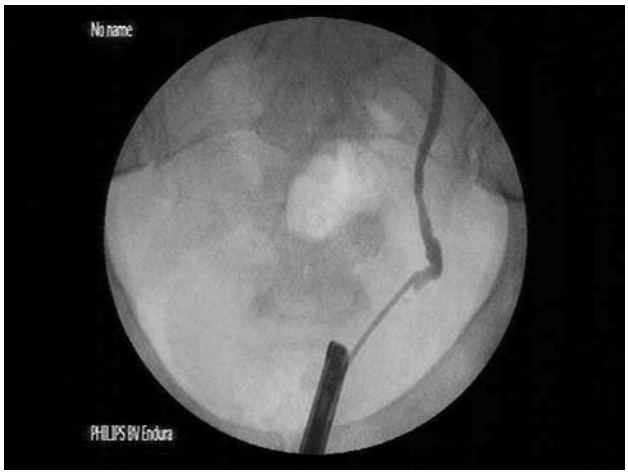

Fig. 4 Retrograde pyelography, performed before the stent was inserted in the *left* ureter, shows a radiolucent filling defect near the *left* ureteral orifice

Discussion

Few studies have addressed atazanavir-associated urinary urolithiasis [2–5]. We reported the first case of renal insufficiency due to bilateral ureteral stone impaction by stones composed of pure atazanavir [6]. Brewster and Perazella reported one patient with acute renal failure due to interstitial nephritis associated with atazanavir without accompanying urolithiasis [7]. Stones composed of pure atazanavir are yellowish in color, friable, and radiolucent on plain radiography and CT.

It is well known that urolithiasis occurs in 4 to 13% of patients receiving indinavir for the treatment of HIV infection [8]. However, atazanavir-associated stones were found in only 0.97% of patients in a multi-institutional trial of atazanavir [5]. The HIV protease inhibitor atazanavir is metabolized by the liver in a manner similar to that of indinavir, with approximately 7% of the dose being excreted unchanged in urine after a single 400-mg dose. On the basis of the pharmacokinetics of atazanavir, maintenance of a high urinary output and urine acidification may help prevent atazanavir crystallization and recurrent urolithiasis. The solubility of atazanavir is pH-dependent (maximal solubility pH 1.9), whereas urine acidification to prevent atazanavir-associated urolithiasis may be poorly tolerated and possibly harmful, especially in patients receiving concomitant treatment with sulfonamide derivatives [9]. Couzigou et al. reported that only one of six patients who continued receiving atazanavir therapy despite urolithiasis experienced recurrent urolithiasis [5]. Whether atazanavir should

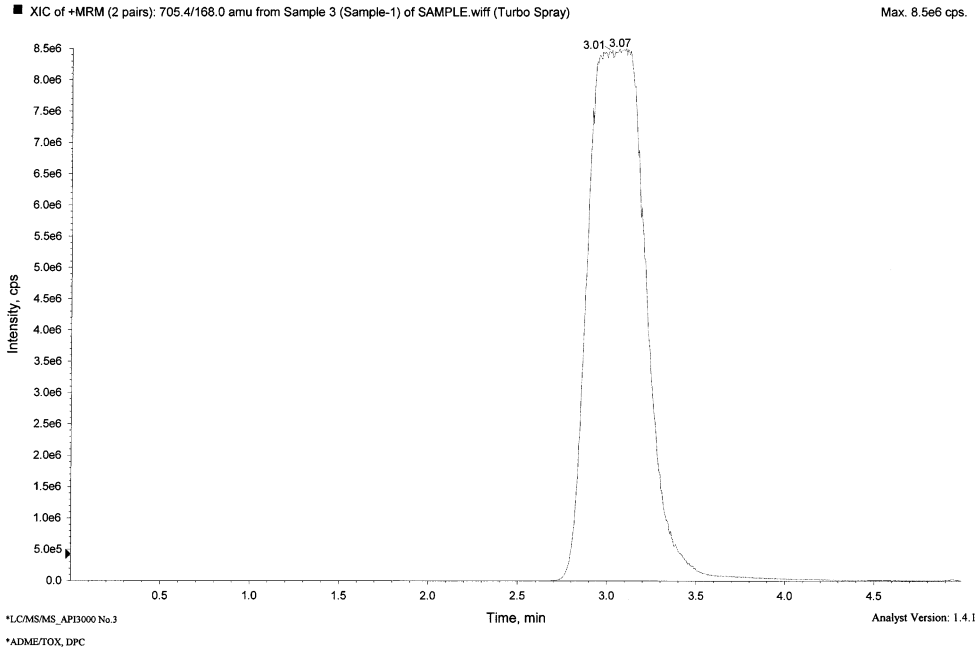

Fig. 5 Liquid chromatography of the stone specimen removed from the *right* orifice shows it to be composed of pure atazanavir crystals

be discontinued in patients with urolithiasis is controversial. Clinicians should be aware that atazanavir therapy can cause the formation of unusual radiolucent stones.

Conflicts of interest statement The authors have no conflicts of interest.

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