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Ureterolithiasis in Human Immunodeficiency Virus (HIV) Patients Treated with Single-Use Ureteroscope: A Case Report

Authors' Contribution:

Study Design A
Data Collection B
Statistical Analysis C
Data Interpretation D
Manuscript Preparation E
Literature Search F
Funds Collection G

AF 1 **Lin Xiong**
AF 2 **Nga-Nuen Loo**
AF 1 **Zhen-Quen Lu**
AF 1 **Xiang Xu**
AF 1 **Genggeng Wie**

1 Department of Urology, The University of Hong Kong-Shenzhen Hospital, Shenzhen, Guangdong, PR China
2 International School, Jinan University, Guangzhou, Guangdong, PR China

Corresponding Author: Lin Xiong, e-mail: xionglin1978@126.com

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Conflict of interest: None declared

Case series

Patient: Two patients
Final Diagnosis: Urolithiasis
Symptoms: Recurrent back pain • recurrent intermittent right lumbar pain and discomfort
Medication: —
Clinical Procedure: —
Specialty: Urology

Objective: Unusual clinical course

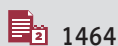
Background: The number of HIV-positive patients is increasing worldwide. Such patients with upper urinary tract stones have been treated primarily with flexible ureteroscopy.

Case Reports: Two patients with HIV and upper urinary tract stones were treated with a single-use digital flexible ureteroscope between July 2021 and January 2022. Both cases were treated by transurethral ureteroscope lithotripsy with a Guangzhou Redpine single-use digital flexible ureteroscope. This is also the first reported case of using a disposable ureteral flexible scope to manage a patient with upper urinary tract stones in combination with HIV. The holmium laser power was set to 0.2-0.6j/20-50 Hz for fragmentation and 1.0-1.5j/10-20 Hz for the dusting of the stones. Renal stones larger than 1 cm were dusted to around 1 cm first, and then a lithotripsy basket was used to remove them. The f5 Polaris Ultra ureteral stent was implanted during the procedure. The operations went smoothly. Four weeks after surgery, CT scans revealed a 4 mm stone remnant in one case, and the ureteral stent was removed in both cases. After 3 months, a kidney, ureter, and bladder X-ray revealed no stones remaining in the case that had earlier shown a 4 mm stone residual. In both cases, the stone composition was made up of calcium oxalate monohydrate and calcium oxalate dihydrate stones.

Conclusions: A single-use flexible ureteroscope has a proven clinical benefit in treating HIV-combined upper urinary tract stones. After the operations, there were no urinary infections, bleeding, or other complications in either patient.

Keywords: HIV • Ureteroscopy • Urolithiasis

Full-text PDF: <https://www.amjcaserep.com/abstract/index/idArt/938608>



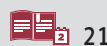
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Background

The number of patients infected with the human immunodeficiency virus (HIV) is gradually increasing worldwide. Urolithiasis is among the most common urological diseases. The number of HIV-positive patients with upper urinary tract stones is increasing year by year. Flexible ureteroscopic lithotripsy has become the primary treatment method for upper urinary tract stones. In the past, reusable flexible ureteroscopes (ru-fURS) were mainly used. However, ru-fURS are easy to damage, and their high maintenance cost also limits the large-scale use of the equipment. The single-use flexible ureteroscope has been gradually applied to clinical work and is gradually replacing ru-fURS. To evaluate the clinical efficacy of a single-use flexible ureteroscope (su-fURS) on HIV-positive patients, we retrospectively analyzed 2 cases of HIV-positive patients treated between July 2021 and January 2022 with upper urinary tract stones. The 2 cases are presented as follows.

Case Reports

In case 1, a male patient was admitted due to recurrent back pain for 1 week. The patient had a history of HIV for 8 years and had been taking antiretroviral drugs for 1 year. His CD4+ T lymphocyte count was ≥ 200 cells/ μl . The urological CT examination (**Figure 1**) suggested a left ureteropelvic junction stone and a left kidney stone. The stone was $18 \times 11 \times 11$ mm, with a maximum Hounsfield unit (HU) of 1139 and a mean HU of 968. The diagnosis was a left ureteropelvic junction stone and a left kidney stone. The patient underwent left transurethral flexible lithotripsy and left ureteral stenting. The operation was successful.

In case 2, a male patient was admitted due to recurrent intermittent right lumbar pain and discomfort. The patient had a history of HIV for 3 years and had been taking antiretroviral drugs for 2 years. The CD4+ T lymphocyte count was ≥ 200 cells/ μl . The urological CT examination (**Figure 2**) suggested multiple renal stones in the right kidney. The stones were around 10 mm in diameter, with a maximum HU of 1365 and a mean HU of 1121. The diagnosis was right multiple renal calculi. The patient underwent right transurethral flexible lithotripsy and ureteral stenting. The operation was successful.

Before the surgery, we usually perform urological CT or CT urography if necessary. We do not perform Retrograde Pyelogram. In both of the present cases, the surgery was performed in a lithotomy position with routine sterilization and draping. Firstly, the ureteroscope was placed into the ureter under direct vision and the guidewire was inserted around 30 cm. The ureteroscope was withdrawn and a ~37-cm ureteral flexible sheath was left in place. Then, we inserted the single-use digital

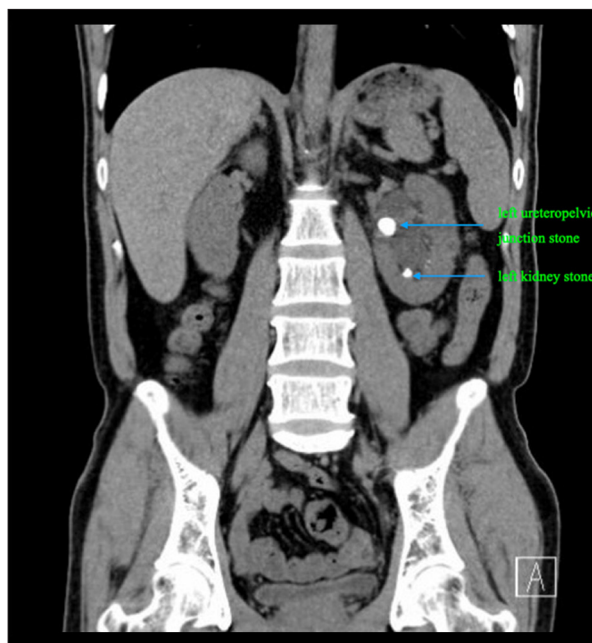


Figure 1. Urological CT of patient 1 suggested a left ureteropelvic junction stone and left kidney stone (as labeled).



Figure 2. Urological CT of patient 2 suggested multiple renal stones in the right kidney (as labeled).

flexible ureteroscope (Guangzhou Redpine) and observed the distance from the ureteroscope to the ureteropelvic junction. We then withdrew the ureteroscope and adjusted the ureteroscope sheath to slightly below the ureteropelvic junction. We used Lumines Holmium Laser fiber, with a fiber size of 200 μm . The holmium laser power was set to 0.2-0.6j/20-50 Hz



Figure 3. An X-ray of patient 1 showing that an f5 Polaris Ultra ureteral stent (as labeled) remained in place post-operation.

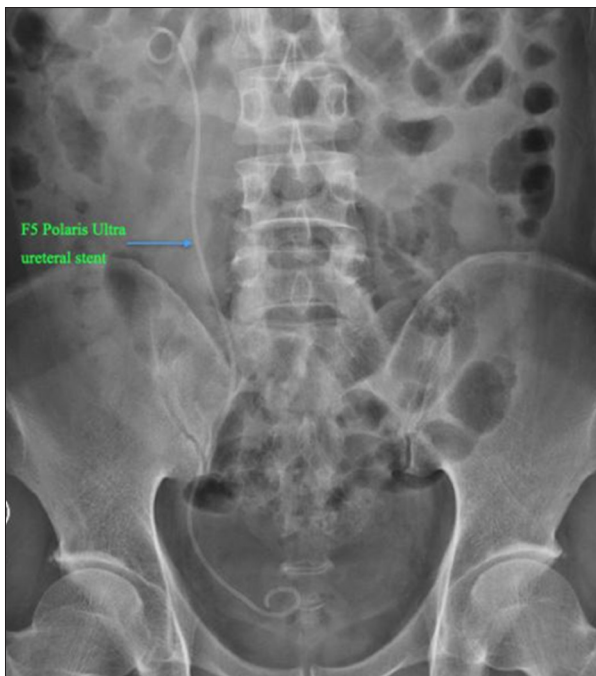


Figure 4. An X-ray of patient 2 showing that an f5 Polaris Ultra ureteral stent tube (as labeled) remained in place post-operation.

for fragmentation and 1.0-1.5j/10-20 Hz for the dusting of the stones. The renal stones smaller than 1 cm were fragmented and removed with a tipless basket. Renal stones larger than 1 cm were dusted to around 1 cm first, and then a lithotripsy basket was used to remove them. Heavy stone loads were handled in multiple operations, with each operation restricted to 1.5 hours. An f5 Polaris Ultra ureteral stent tube remained in place following surgery (Figures 3, 4). The infrared stones' component analysis in the 2 cases suggested both calcium oxalate monohydrate and calcium oxalate dihydrate.

The patient in case 1 underwent a CT scan which showed that there were 4-mm residual stones in the kidney. The ureteral stent was removed. Three months post-operation, a kidney, ureter, and bladder (KUB) X-ray was performed, and this indicated that the left renal stone had disappeared. The recurrent back pain had also disappeared.

The patient in case 2 underwent a urological CT which indicated that there were some stone residues, smaller than 2 mm, in the right lower calyx. The ureteral stent was removed. The recurrent intermittent right lumbar pain and discomfort resolved.

During the 3-month followup, no postoperative complications, such as urinary infection or bleeding, occurred.

Discussion

Treatment of upper urinary tract stones smaller than 2 cm with flexible ureteroscopic lithotripsy is considered the criterion standard [1]. Torricelli et al [2] reported that treatment of upper urinary tract stones in HIV-positive patients with percutaneous nephrolithotripsy is associated with an increased risk of complications compared with this treatment in ordinary patients, including a significantly increased risk of bleeding. This entails not only risk to the patient but also to the health care workers. Flexible ureteroscopy does not require sharp objects like scalpels or needles, which serves to minimize the possibility of sharp injuries to the operation team. Both cases were operated during the coronavirus disease 2019 (COVID-19) pandemic. In addition to the regular protective equipment, COVID-19 essential protective personal equipment was also being used, including disposable coveralls, disposable shoe protective covers, and disposable particulate respirators.

Up to the present, HIV antiretroviral drugs are the most common cause of drug-associated renal stone formation [3,4]. Although the patients in both cases were on long-term oral HIV antiretroviral drugs, the analysis of stone composition was primary stone formation. Some scholars report that the risk of postoperative complications in patients with a CD4+ T lymphocyte count of ≥ 200 cells/ μ l is higher than that with patients with a

CD4+ T lymphocyte count of <200 cells/ μ l [5,6]. The CD4+ T lymphocyte count in both of the present patients was \geq 200 cells/ μ l, and no significant postoperative complications occurred.

For flexible ureteroscopy lithotripsy, using a traditional ru-fURS has its pros and cons. Cons include the high cost of procurement and maintenance [7,8], poor durability, decreased performance after repeated use, the risk of incomplete sterilization of the equipment, and damage to the lens during circulation [9]. The emergence of the su-fURS solves the above problems. Many reports have found that the overall medical expenditure [10] and the risk of postoperative infection and complications can be reduced by using a su-fURS [11]. From 2016 to 2021, our center has been using the Storz electronic fiberoptic ru-fURS. According to our statistics, ru-fURS devices suffered degradation after 17 operations. The minimum repair cost of a ru-fURS was USD\$190 per use. The international data on how many operations can be performed before damage to ru-fURS occurs varies dramatically, ranging from 10 to 100 operations, and the cost of repair varies widely as well [7,12].

The emergence of LithoVue™ marked the era of merging disposable ureteral flexible scopes with electronic scopes [13]. The redpine disposable electronic ureteral flexible scope is one of many disposable electronic ureteral flexible scopes [14] that have begun to be independently developed in China. These scopes can achieve comparable clinical efficacy with scopes developed outside China [15,16]. Legemate et al [17] reported that 1 in 8 ru-fURS were found to have microbial contamination. Ofstrad et al [18] reported that the methods used to disinfect re-fURS in between use with different patients were inadequate. Tests found that 100% of the sterilized ru-fURS were contaminated, with 13% microbial growth and 63% hemoglobin. The hemoglobin contamination levels on the ru-fURS exceeded benchmarks for clean gastrointestinal endoscopes. As one of the routes of transmission of HIV is blood transmission,

the use of a su-fURS for flexible ureteroscope lithotripsy can avoid the above risks and reduces the sterilization process.

Dusting and fragmentation with extraction approaches to ureteroscopic stone treatment have been a controversial topic [19]. Both treatment modalities are generally effective but each does have relative advantages and disadvantages. Su-fURS can retrieve more stones than ru-fURS [20]. Physicians have their own experiences in the management of upper urinary tract stones. Multescu et al [21] state that upper urinary tract stones smaller than 1 cm should be fragmented and removed by a stone retrieval basket. Renal stones larger than 1 cm should be first dusted to around 1 cm, and then fragmented into smaller pieces that can be extracted by a stone retrieval basket. We routinely apply this method in general flexible ureteroscopy lithotripsy, including in these cases with HIV-positive patients. The method shows definite clinical effectiveness. We typically begin with 0.2 J single-frequency energy at 50 Hz to powder the renal stone. When the stone is powdered to around 1 cm, we switched to a 1.5 J single energy at 10 Hz to fragment the stone into smaller pieces. The stone fragments were then taken out with a stone retrieval basket.

Conclusions

The use of su-fURS is clinically effective in treating HIV-positive patients with upper urinary tract stones. After the operations, there were no urinary infections, bleeding, or other complications.

Declaration of Figures' Authenticity

All figures submitted have been created by the authors who confirm that the images are original with no duplication and have not been previously published in whole or in part.

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