

Research Article

Semi-rigid Ureteroscopy in the Treatment of Upper Urinary Tract Stones in Two University Hospitals in Burkina Faso: Preliminary Results

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Abstract

Introduction: Ureteroscopy (URS) is a minimally invasive procedure that has become a common practice in endourology over the last two decades. Our study was initiated to evaluate the preliminary results of this technique in two university hospitals in Burkina Faso. **Materials and methods:** this was a retrospective descriptive study conducted over a 10-month period from January 1 to October 31, 2023. It included patients who underwent semi-rigid ureteroscopy for the treatment of upper urinary tract calculi. **Results:** we recruited 26 patients. The mean patient age was 39.65 years, with a range of 23 to 70 years. The calculus was right-sided in 61.54% (n=16) of cases and left-sided in 38.46% (n=10). The stone location was pelvic in 69.23% (n=18) and lumbar in 30.77% (n=8). The mean stone size was 13.73 mm, with a range of 7 to 22 mm. The mean stone density was 964.57 Hounsfield Units (HU), with a range of 457 to 1522. The mean fragmentation time was 97 minutes, with a range of 55 to 145 minutes. The mean hospital stay was 2 days, and the stone-free rate was 100%. **Conclusion:** Semi-rigid ureteroscopy is new practice in Burkina Faso. It represents a valuable alternative for the management of upper urinary tract stones.

Keywords

Semi-rigid Ureteroscopy, Laser, Ballistic Lithotripsy

1. Introduction

Ureteroscopy (URS) is a minimally invasive procedure that has become a common practice in endourology over the last two decades. With the development of endoscopic techniques, minimally invasive management has become an effective

alternative for stones smaller than 2 centimeters. The miniaturization of endoscopes and advances in methods for stone fragmentation and extraction have made this technique an effective and reliable modality for the treatment of ureteral

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Received: 14 October 2025; **Accepted:** 31 October 2025; **Published:** 9 December 2025



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stones, with minimal morbidity [1]. The first ureteroscopy for stone extraction was performed in 1980 by Perez-Castro-Ellendt and Martinez-Pineiro [2]. In Africa, Niang L et al. in Senegal [3] reported a success rate of 85.7% in 2016; Diarra A et al. in Mali [4] noted a success rate of 90% in their 2020 study. Ureteroscopy is a new practice in Burkina Faso, and no study has yet been conducted on this technique. Our work was initiated to evaluate the preliminary results of this technique in two university hospitals in Burkina Faso.

2. Patients and Methods

This was a retrospective descriptive study conducted over a 10-month period from January 1 to October 31, 2023. Our study included all patients admitted for upper urinary tract stones and treated with ureteroscopy using laser or lithoclast fragmentation in the urology departments of the Yalgado Ouédraogo University Hospital in Ouagadougou and the Sourô Sanou University Hospital in Bobo-Dioulasso. Data were collected using a questionnaire from consultation registers and patient clinical records. Our data sources included a patient interview conducted upon admission, patient observation files, and operative report registers.

The various variables studied were socio-demographic data,

clinical findings, paraclinical test results, intraoperative and postoperative data, and outcomes. Control imaging with KUB and renal ultrasound was done in postoperative for check residual stone. The collected data were analyzed using EXCEL 2016 and STATA software. Consent was obtained from the patients for data publications and any accompanying images. Ethical approval was obtained from the local ethical committee.

3. Results

In total, 26 semi-rigid ureteroscopies were indicated for the fragmentation of ureteral stones from January 1 to October 31, 2023, out of a total of 53 patients admitted for upper urinary tract calculi at Yalgado Ouedraogo University Hospital in Ouagadougou and Sourô Sanou University Hospital in Bobo-Dioulasso. The hospital frequency of ureteroscopy was 49.05% (26 ureteroscopies performed in 53 patients with upper urinary tract stones).

The mean age of the patients was 39.65 years, with a range of 23 to 70 years. The age group [21-30 years] was the most represented. Table 1 shows the distribution of patients by age group.

Table 1. Distribution of patients by age group.

Age Group (years)	Frequency (N)	Percentage (%)
21-30	10	38.46
31-40	5	19.23
41-50	5	19.23
51-60	3	11.54
61-70	3	11.54
Total	26	100

Men and women were equally represented, with a sex ratio of 1. The majority of our patients were housewives (42.31%), followed by merchants (30.77%).

All our patients were followed in the urology department for lumbar pain or were referred from other hospitals for an average of 12 months, with a range of 6 to 26 months. Renal colic was the main reason for consultation, found in 57% of patients, while 43% were admitted for intermittent lumbar pain.

The general condition was preserved in all our patients. Physical examination revealed tenderness of the lumbar fossa

in 76.92% of cases (n = 20) and pain at the mid-ureteral points in 30.76% of cases (n = 8).

Renal ultrasound and computed tomography urography (CTU) were performed on all patients. The renal parenchyma was preserved in all patients.

CTU allowed us to determine the topography of the urinary stones. The calculus was right-sided in 61.54% (n=16) and left-sided in 38.46% (n=10). The stone location was pelvic in 69.23% (n=18) and lumbar in 30.77% (n=8). The mean stone size was 13.73 mm, with a range of 7 to 22 mm. Distribution of patients by stone size was presented in Table 2.

Table 2. Distribution of patients by stone size.

Stone Size (mm)	Frequency (N)	Percentage (%)
≤10	2	7.69
11-15	19	73.08
16-20	4	15.38
>20	1	3.85
Total	26	100

The mean stone density was 964.57 Hounsfield Units (HU), with a range of 457 to 1522 HU.

Six patients had a positive urine culture (including 4 cases of *Escherichia coli*, one case of *K. pneumoniae*, and one case of *Candida albicans*) and were treated 72 hours prior to the procedure.

About therapeutic aspects, all our patients underwent general anesthesia with orotracheal intubation. They were placed in the lithotomy position with the homolateral lower limb in semi-flexion. Antibiotic prophylaxis with ceftriaxone was administered to patients whose urine analysis did not reveal any pathogens. A primary double-J stent was placed in one patient due to a narrowed ureteral orifice. All our patients underwent semi-rigid ureteroscopy with prior placement of a Terumo-type ureteral guidewire. A laser was used for stone fragmentation in 53.85% of cases, and a lithoclast was used in 46.15%. All patients were judged to be stone-free intraoperatively. Following fragmentation, a double-J ureteral stent was placed in all patients, along with an indwelling transurethral urinary catheter. The mean fragmentation time was 97 minutes, with a range of 55 to 145 minutes. No intraoperative incidents were observed.

The urinary catheter was removed on postoperative day 1 in all our patients. The postoperative course was uneventful for all patients. All patients underwent a control plain abdominal X-ray (KUB) on postoperative day 1, and all double-J stents were in good position. The mean hospital stay was 2 days. The mean duration of excretory tract drainage was 15.6 days, with a range of 10 to 35 days.

All our patients were seen at the first and third months after surgery, and the clinical outcome was favorable, marked by the resolution of painful symptoms. Control imaging with KUB and renal ultrasound did not reveal any residual stones or dilation of the excretory cavities. The short- and medium-term results were satisfactory.

4. Discussion

During the study period, 53 patients underwent surgery for upper urinary tract stones, of whom 26 patients underwent ureteroscopy. The hospital frequency was 49.3%. Indeed, ureteroscopy is an emerging and rapidly growing technique in

Burkina Faso. Both therapeutic modalities, namely laser fragmentation and ballistic lithotripsy, are available.

The mean age in our study was 39.65 years, with a range of 23 to 70 years. This mean age is not far from the 42.7 years found by Berthé HJG et al. [5] in Mali. The mean patient age was 44.7 ± 13.9 years in the study by Niang et al. [3] in Senegal, while that of Göksel B. et al. [6] in Turkey found approximately 39 years, similar to Boudhaye et al. [7] who found 37.94 ± 11.91 years. All these data are consistent with the literature, which shows that urinary stone disease primarily affects young adults in the 40 to 50-year age group, who represent the working-age population.

All patients were admitted for renal colic or intermittent lumbar pain of varying intensity and rhythm. The pain of renal colic is related to the proximal distension caused by the obstructive nature of the stone. Niang et al. [3] in Senegal noted renal colic in all patients, as did Göksel B. et al. [6]. Renal colic was present in 81% of the patients in the study by Boudhaye et al. [7]. All our patients underwent renal ultrasound. Indeed, ultrasound is the first-line imaging investigation for any lumbro-abdominal pain in our context. It is an accessible and affordable examination but provides poor visualization of the ureter. CTU is the imaging modality with the highest sensitivity and specificity for detecting urinary stones. It can identify all stones in the urinary tract regardless of their density and size. It provides information on the shape, exact number, and dimensions of the stone in 3D representation. All patients underwent CTU, which allowed for precise localization of the stone, as well as its size and density.

All our patients underwent general anesthesia with orotracheal intubation to control respiratory movements or other patient reflexes that could lead to accidents or equipment damage. General anesthesia provides patient relaxation, which offers comfort for the surgeon. Indeed, these points are confirmed by the study by Lechevallier et al. [1] on ureteroscopy.

The mean operative time was 97.5 minutes, with a range of 55 to 145 minutes. Djé et al. [8] found a mean duration of 61.92 minutes, with a range of 40 to 72 minutes. Padja et al. [9] in their 2015 study noted a shorter operative time than ours, at 73 ± 25 minutes. In the literature, the average time to fragment a 10 mm stone is 60 minutes. However, this time also depends

on stone parameters (notably size, location, and density), the quality of the ureteroscope for good visibility, the choice of fragmentation source parameters, and, above all, the experience of the operator.

The mean hospital stay was 2 days in our study. Niang et al. [3] noted a similar mean duration of 2 days. Similar results have been noted by other authors [10, 11]. Djé et al. [8] reported a shorter mean hospital stay of 12.53 hours in their study, with a range of 7 to 24 hours. Indeed, ureteroscopy can be an outpatient procedure if it proceeds without difficulty. However, for reasons of patient preparation and verification of the surgical kit, our patients are admitted the day before, thus prolonging the hospital stay. The hospital stay was 1 day in 90.2% of cases in the study of Kassogue [12].

All our patients were asymptomatic at the 1-month and 3-month postoperative follow-up. They underwent renal ultrasound and a KUB (Kidneys, Ureters, Bladder) X-ray at 3 months postoperatively. Our patients were judged stone-free based on the absence of stones on imaging. Our results are comparable to the data from Kutchukian et al. [13], who achieved a 100% success rate. Djé et al. [8] also reported a 100% success rate. Indeed, laser URS and ballistic URS are effective techniques for managing ureteral stones. The success of the procedure depends on the size of the stone, the nature of the stone, and the surgeon's experience. The success rate in the literature ranges between 85% and 100%.

5. Conclusion

Semi-rigid ureteroscopy is a relatively recent intervention in Burkina Faso. It is a minimally invasive technique that is useful in the treatment of urinary stones. Based on these results, we can say that laser and ballistic ureteroscopy is a reliable, safe, effective, and reproducible technique in experienced hands. It is a treatment of choice for managing ureteral stones. The challenge lies in mastering this technique and acquiring the necessary equipment.

Abbreviations

URS	Ureteroscopy
HU	Hounsfield Units
CTU	Computed Tomography Urography
KUB	Kidneys, Ureters, Bladder

Conflicts of Interest

The authors declare no conflicts of interest.

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