

Research Article

Laser Ureteroscopy for Calculi in the Upper Urinary Tract: Bicentric Study, Urology Department of Libreville University Hospital, SOS Medecins Clinic

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Abstract

Introduction: Urinary lithiasis represents a significant part of urological practice. Today, it is mainly treated endoscopically. The advent of the flexible ureteroscope (FUS) and laser has further improved the treatment of renal stones. In this paper, we report on our experience in terms of indications and results. **Patient and methods:** This was a retrospective, descriptive, and analytical study conducted between January 1, 2015, and December 31, 2024, in the urology department of the Libreville University Hospital and a partner private clinic (SOS Medecins). The study included the complete records of patients who underwent semi-rigid or flexible ureteroscopy for upper urinary tract stones with laser fragmentation. The parameters studied were gender, age, reason for consultation, medical history, characteristics of the lithiasis, laterality, indication, duration of the procedure, occurrence of any incidents or accidents, length of hospital stay, and outcome. Success was defined as the absence of lithiasis or the presence of lithiasis fragments less than 3 mm in diameter. Data analysis was performed using SPSS version 20.0 software; means, standard deviations, frequencies, and extremes were calculated. **Results:** 88 laser ureteroscopies were performed on 82 patients. There were 55 men and 33 women, giving a sex ratio of 1.7. The average age was 42.97 years (range 21 to 77 years). The main reason for consultation was renal colic in 70 patients (79.54%), followed by chronic low back pain in 12 patients (13.64%). The stones were unilateral in 75 patients (91.5%) and bilateral in 7 (8.5%). The locations were mainly pyelic and middle calyceal (19.3% each). The average size of the stones was 8 mm (ranging from 3 to 35 mm). The overall success rate was 93.9%. Postoperatively, complications were minor according to the Clavien-Dindo classification and occurred in 6.1% of cases. The average length of hospital stay was 3 days. **Conclusion:** The treatment of upper urinary tract lithiasis by laser ureteroscopy has been effective in Libreville for 10 years, despite its high cost, which limits its use. Its practice is becoming commonplace in view of the advantages it offers compared to conventional surgery.

Keywords

Urinary Lithiasis, Ureteroscopy, Laser

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1. Introduction

Urinary stone represents a significant part of urological practice [1]. Today, it is mainly treated using endoscopic techniques [2]. The advent of the flexible ureteroscope (FUS) and laser has further improved the treatment of renal stones. The indications for semi-rigid and flexible ureteroscope are well codified by learned societies, but their applicability remains subject to several parameters, such as the availability of equipment. While the use of these new technologies has been commonplace in Europe for several decades [3], in Africa we are gradually seeing the mastery and popularization of this technique. In this paper, we report on our experience in terms of indications and results.

2. Patients and Methods

This was a retrospective, descriptive, and analytical study conducted between January 1, 2015, and December 31, 2024, in the urology department of the Libreville University Hospital and a partner private clinic (SOS Medecins). The study included complete records of patients who underwent semi-rigid or flexible ureteroscopy for upper urinary tract stones with laser fragmentation. The parameters studied were gender, age, reason for consultation, medical history, characteristics of the lithiasis (number, measurements, location, density), laterality, indication, duration of the procedure, occurrence of any incidents or accidents, length of hospital stay, and outcome. The paraclinical assessment for diagnosis included a uroscan. Ureteroscopy was systematically preceded by the insertion of a double J stent (7 or 6 French) 10 to 15 days beforehand in all our patients. The procedure was performed under spinal or general anesthesia. The laser used was the Holmium YAG. The laser fiber was 230 μm for calyceal stones and 360 μm for ureteral and pyelic stones. During our study, we used two reusable flexible ureteroscopes, one semi-rigid ureteroscope, and single-use ureteroscopes. An access sheath was systematically used with a length of 35 or 45, an external diameter of 14, and an internal diameter of 12 Ch. The lithiasis fragments were extracted using a Dormia-type stone basket. A double J stent was left in place in cases of ureteral irritation or stones encrusted in the ureteral wall. A follow-up ureteroscopy or CT urogram was performed to confirm success, defined as the absence of stones or the presence of stone fragments less than 3 mm in diameter, within 4 weeks after surgery. The double J stent was removed after this follow-up. Electrospectrophotometric and infrared analysis of the stones was not performed in any of our patients. Data analysis was performed using SPSS version 20.0 software; means, standard deviations, frequencies, and extremes were calculated.

3. Results

During the period in question, 88 laser ureteroscopies were

performed on 82 patients.

There were 55 men and 33 women, giving a sex ratio of 1.7.

The average age was 42.97 years (range 21 to 77 years). Twelve point two percent of our patients had a history of lithiasis. The main reasons for consultation were renal colic in 65 patients (79.26%), followed by chronic low back pain in 12 patients (14.63%) [Table 1].

Ureteroscopy was indicated as a first-line treatment in 87% of patients and as a second-line treatment in addition to pyelolithotomy for residual stones in 7% (6 patients).

Three (3.4%) were for diagnostic purposes (tumor of the upper urinary tract, compressive intracaliceal renal cyst, ureteral stenosis), and 85 (96.6%) were therapeutic.

The stone was unilateral in 75 patients (91.5%) and bilateral in 7 (8.5%).

The locations were mainly pyelic and middle calyceal (23.18% each) [Table 2]. The average size of the stones was 8 mm (range 3 to 35 mm). The average duration of the procedures was 55 minutes. Ureteroscopy did not find the stone (blank ureteroscopy) in 7 patients, although the initial CT scan (before double J stent placement) showed lithiasis. Spontaneous expulsion of the stone was retained as the final diagnosis with confirmation of the emptiness of the urinary tract on the follow-up CT scan. The overall success rate was 93.9%. The procedure could not be completed in 5 patients (6.1%), including 1 case of significant hematuria impairing visibility, one case of pyuria, one case of aspiration due to detachment of the ureteral mucosa, and one case of ureteral perforation, and one case where it was impossible to position the stone in line with the laser fiber. Double J stent drainage was then recommended, and the procedure was repeated 10 to 15 days later. Postoperatively, minor complications according to the Clavien-Dindo classification were found in 5 patients (6.1%), including 4 cases of low back pain and 1 case of pyelonephritis, all of which responded favorably to medical treatment. Two patients showed signs of intolerance to the double J stents (renal colic associated with pollakiuria, burning during urination, and cystalgia), leading to their removal in the operating room on the second postoperative day. The average length of hospital stay was 3 days (range 2 to 5), extending beyond 3 days in cases of postoperative complications.

Table 1. Initial symptom.

Symptomes	Number of patients	Pourcentage (%)
Renal colic	65	79.26%
Lowback pain	12	14.63%
Acute pyelonephritis	3	3.66%
Chance finding	2	2.44%

Table 2. localization of urinary lithiasis.

Site	Number	Pourcentage (%)
Pelvic ureter	9	10,94%
Lumbar ureter	15	18,29%
Pyelic	19	23,18%
Lower calice	14	17,08%
Medium calice	19	23,18%
Upper calice	6	7,32%

4. Discussion

There were 55 men and 33 women, giving a sex ratio of 1.7. This male predominance is also found by Padja in Morocco [4]. The literature does not report any studies that have examined this male predominance. One hypothesis could be hormonal factors, particularly sex hormones. The average age in our study was 42.97 years, similar to the results of Niang et al. in Senegal [5] and Mbaeri et al. in Nigeria [6], who both found an average age of 44.7 years. More generally, these results are consistent with the literature on the average age of onset of lithiasis [7-9]. Young adults, with an age range of 40 years, seem to constitute the peak age of onset of this condition. The main reason for consultation is renal colic, which may be associated with other urinary symptoms. In our study, renal colic accounted for 79.59% of cases, followed by chronic low back pain. Boudhayé et al [10] in Mauritania found 51% of cases of renal colic, followed by burning urination and dysuria. Olufunmilade Omisanjo et al [11] in Nigeria found 36% of cases of renal colic, followed by hematuria, as symptoms indicative of lithiasis. Ureteroscopy was indicated as the first-line treatment in 87% of patients in our series. The unavailability of extracorporeal shock wave lithotripsy (ESWL) or adequate technical facilities for performing percutaneous nephrolithotomy (PCNL) in Gabon explains the choice of this approach. Other African studies also show that other approaches also give good results. For example, Ze Ondo et al in Senegal [12], who evaluated the effectiveness of ESWL in 76 patients, found a success rate varying between 65.2 and 100% depending on the location of the stone. Traore et al. in Tunisia reported 44 cases of ureteroscopy with a stone-free rate of 65.9%. These therapeutic modalities have the advantage of a short hospital stay and low morbidity and mortality compared to conventional surgery. However, these techniques require expensive technical equipment (nephroscope, ureteroscope, laser, access sheath, etc.), which is not available in many healthcare facilities or is only available at high cost. In our study, ureteroscopy/laser treatment was performed at a partner private clinic, which further increased the cost of this treatment. The stone was unilateral in 75 patients (91.5%) and bilateral in 7 (8.5%). Ouattara et al [13] found 93.4% of stones to be unilateral. The literature generally confirms the unilateral predominance of lithiasis, with a predominance on the right side [14]. The average size of

lithiasis varies depending on the study. In our series, it was 8 mm (range 3 to 35 mm). Our result is similar to that of Niang et al [5], who found an average of 10 mm. Mbaeri in Nigeria and Berthe in Mali [6, 15] found averages of 15.4 mm and 15.2 mm, respectively. The size of the stone is no longer a limiting factor in performing ureteroscopy. The overall success rate was 93.9%. This is similar to the rates found by Ben Saddick in France [16], who found success rates of 89.3% and 97.1% after 2 and 3 sessions of flexible laser ureteroscopy for stones measuring 2 to 3 cm, and by Jian-Sheng Huang in China [17], who found success rates after 1, 2, and 3 sessions of laser ureteroscopy of 61.9%, 82.9%, and 89.5%, respectively, for stones larger than 2 cm. Niang in Senegal found an 85.7% success rate linked to a high failure rate for iliac and lower calyceal stone locations. Postoperatively, complications were minor according to the Clavien-Dindo classification and accounted for 6.1%. This rate is similar to that found by Boudhayé in Mauritania [10] and Niang in Senegal [5], who found 6.3% and 6.6% complications, respectively, which were mainly minor. The average length of hospital stay was 3 days (range 2 to 5 days). Patients who stayed longer than 3 days were those who had experienced a post-operative complication. Padja in Morocco and Niang in Senegal [5] also found an average length of hospital stay of 2 days.

5. Conclusion

The treatment of upper urinary tract lithiasis by laser ureteroscopy has been effective in Libreville for 10 years. Although its use is limited by its high cost, it is nevertheless increasingly practiced given its advantages over conventional surgery.

Abbreviations

FUS	Flexible Ureteroscope (FUS)
ESWL	Extracorporeal Shock Wave Lithotripsy
PCNL	Percutaneous Nephrolithotomy

Conflicts of Interest

The authors declare no conflicts of interest.

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