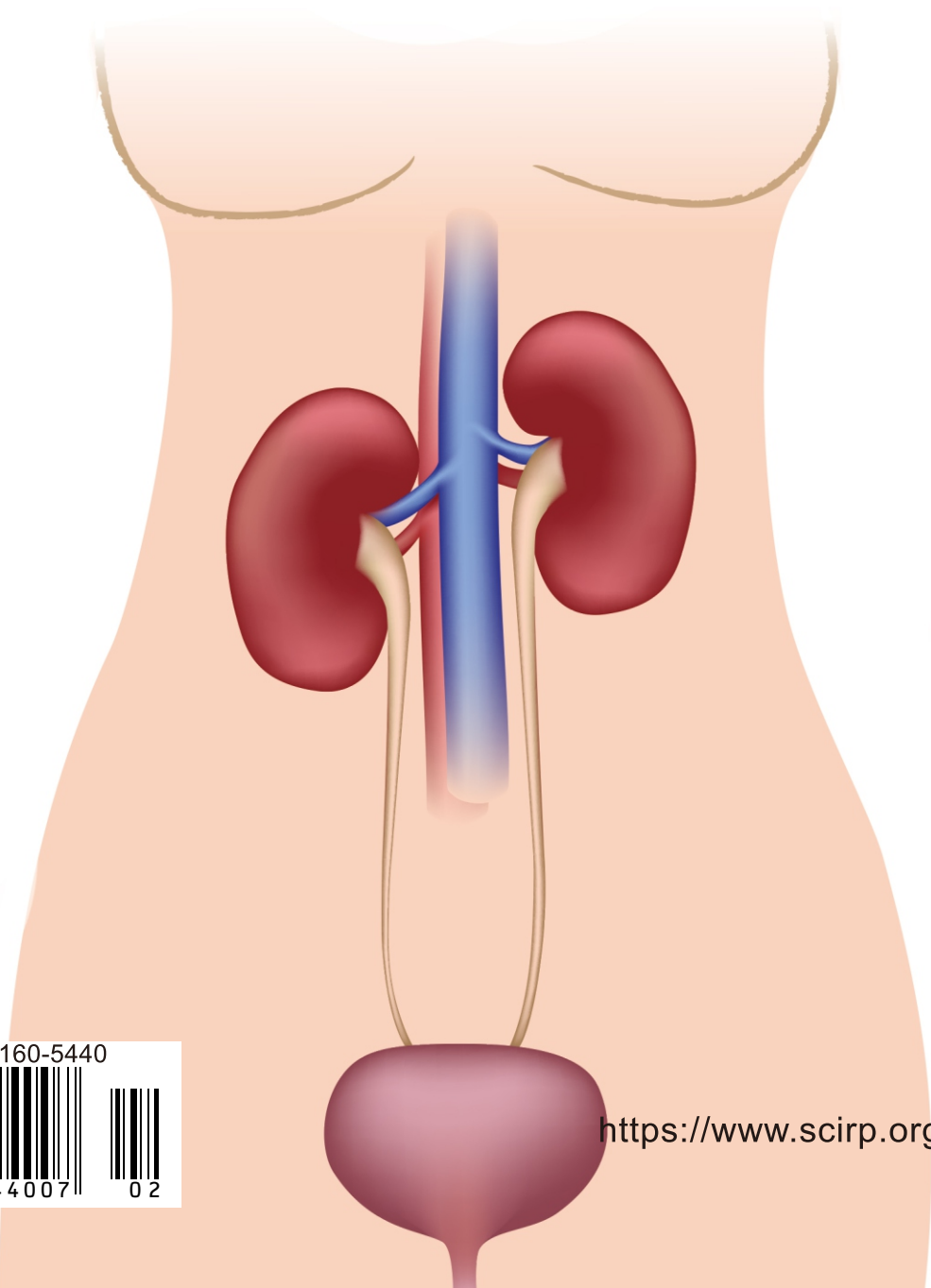


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Holmium Laser Ureteroscopy in the Treatment of the Upper Urinary Tract Stones: Concerning 54 Cases in the Surgical Department of the Saint Camille Hospital of Ouagadougou (Burkina Faso)

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Abstract

The treatment of urinary stones uses a varied therapeutic arsenal. Nowadays the mini-invasive techniques are the most used. We report our first experience on the results of flexible and semi-rigid ureteroscopy in the treatment of the upper urinary tract stones. **Materials and Methods:** A 20-month prospective study on flexible laser ureteroscopy was conducted at the Saint Camille Hospital of Ouagadougou. The inclusion criteria were for patients who had given informed consent and the presence of an unilateral obstructive upper urinary tract stone with an indication of surgical management. **Results:** 54 patients were treated with Holmium laser photo vaporization between January 2018 and August 2019. The average age of patients was 37.74 ± 17 years (11 - 83 years). The men were predominant at 55.56%, or a sex-ratio of 1.25. The average size of stones of $17.55 \text{ mm} \pm 4.16 \text{ mm}$ (11 mm to 25 mm) with pyelic, ureteral and calyceal localization in respectively 42.6%, 33.3% and 24.1% of cases. The average duration of the interventions was 77.92 ± 43.57 minutes (11 to 180 minutes). We used drainage in 90.91% of the cases. The average duration of hospitalization was 1.2 ± 0.73 days with extremes ranging from one day to 6 days. The vaporization without residual fragment which is a success was 78.46%. **Conclusion:** Laser ureteroscopy is a newly used method at the Saint Camille hospital. The achievement of good results and its low morbidity encourage us to promote its extension and its use in sub-Saharan African hospitals.

Keywords

Flexible Ureteroscopy, Laser, Stone, Burkina Faso

1. Introduction

Urinary lithiasis is the presence in the urinary tract (renal cavities, ureters, bladder) of crystalline, mineral, organic or medical concretions [1].

The urinary lithiasis, a highly recurrent pathology, is responsible for several hospitalizations in urology services and can be responsible for many renal functional consequences [2] [3].

The prevalence in western countries is now estimated at around 10% [1]. The risk of developing urinary lithiasis is estimated to be from 5% to 9% in Europe, 12% in Canada and from 13% to 15% in the United States of America (USA) [4]. In Burkina Faso, the hospital prevalence of urinary lithiasis was 12.52% [5].

The treatment of urinary stones uses a varied therapeutic arsenal. In our context of resource-constrained countries, treatment remains predominantly dominated by open-pit/open-air surgery. Nowadays the mini-invasive techniques are the most used.

In the treatment of upper urinary tract stones, Laser Ureteroscopy is an effective and safe method. The therapeutic choice of upper urinary tract stones depends on the location and size of the stones. Laser Ureteroscopy appears to be the appropriate treatment for stones less than 20 mm [6]. Its low morbidity urges some urologists to prefer several sessions of the Laser Ureteroscopy to a Percutaneous Nephrolithotomy when the size of stones exceeds 20 mm [7]. In our poor countries, its accessibility is limited by its high cost and the fragility of the equipment. We report our first experience on the results of flexible and semi-rigid ureteroscopy in the treatment of the upper urinary tract stones.

2. Materials and Methods

A prospective study was conducted between January 2018 and August 2019 (20 months) within the surgical department of the hospital Saint Camille de Ouagadougou. Our study involved 54 patients with unilateral stone. Patient management was done in two stages. All patients received an intervention and those with a residual stone size of more than 3 mm benefited from a second operation. The inclusion criteria were for patients who had given informed consent and the presence of an obstructive stone of the upper urinary tract with indication of surgical management.

The procedure was performed under general anesthesia after checking the sterility of the urine. The administration of prophylactic antibiotic therapy based on ceftriaxone 2 g and gentamycin 160 mg was systematic after the induction of anesthesia.

Using a cystoscope, we scan the bladder and locate the ureteral meatus, then

we set up a guide wire in the renal cavities. A second hydrophilic safety guide wire is also positioned in the renal cavities, then we progress to the stone bed with the semi-rigid ureteroscope on the rail of the two hydrophilic guide wires.

The semi-rigid urethroscope is withdrawn keeping the two guide wires in place. The flexible urethra is placed in the urinary cavities until the stone using the second guide wire leaving the safety guide wire in place. The laser fibres used were 272 or 550 μ depending on the size of the stone. A simple irrigation flow at the pressure of 100 cm of water combined with a hand pump was used to improve irrigation. Most often, the laser has been configured according to the following programmes: the energy of 1.2 J and the frequency of 15 Hz. After complete spraying or obtaining fragments of less than 3 mm, a drainage of the excretory tract by ureteral or double J catheter was proposed. A double J catheter was systematically left in place in patients with incomplete fragmentation of the stones, or with a single kidney and or session longer than 90 minutes and or ureter dilation. A bladder catheter was left in place for 24 hours.

The patients were re-assessed after four weeks by an X-ray of the abdomen, renal ultrasound or CT scan. In the case of residual fragments greater than 3 mm in diameter, a second ureteroscopy time was rescheduled. The success was defined by the complete disappearance of the stone or the persistence of residual fragments of less than 3 mm. patients were advised to hyper hydration to facilitate the evacuation of the fragments. the data collected included patient characteristics (age, sex, reason for consultation, size and location of calculation), surgical and post-operative data (response time, incidents, drainage, duration of hospitalization) and follow-up (control imaging and presence of residual fragments). The data were entered and analysed using the epi info 7 software.

3. Results

3.1. Characteristics of the Study Population

54 patients were treated by stone photo vaporization with Holmium laser between January 2018 and August 2019.

The average age of patients was 37.74 ± 17 years old (11 - 83 years old).

The men were predominant at 55.56%, 30 men and 24 women with a sex-ratio of 1.25.

Lumbar pain with simple nephritic colic type was the reason for consultation in all patients.

3.2. Characteristics of the Stones

The main locations of the lithiasis on the urinary shaft were the renal pelvis, the ureter and the calyces in 23, 18 and 13 of the cases respectively (**Figure 1**).

Several types of lithiasis were found during the ureteronephroscopy sessions with different colors but their physicochemical nature was not specified (**Figure 2**).

The average size of the stones from $17.55 \text{ mm} \pm 4.16 \text{ mm}$ (11 mm to 25 mm).

All patients benefited from a Uro TDM that objectified hyper dense stones whose density was not evaluated.

3.4. Operative Management

The surgery involved 54 unilateral stones. A total of 65 interventions were performed, with a first serial of 54 and a second of 11 repeated interventions.

The average duration of interventions was 77.92 ± 43.57 minutes with extremes of 11 to 180 minutes.

We used drainage in 90.91% of cases (**Table 1**).

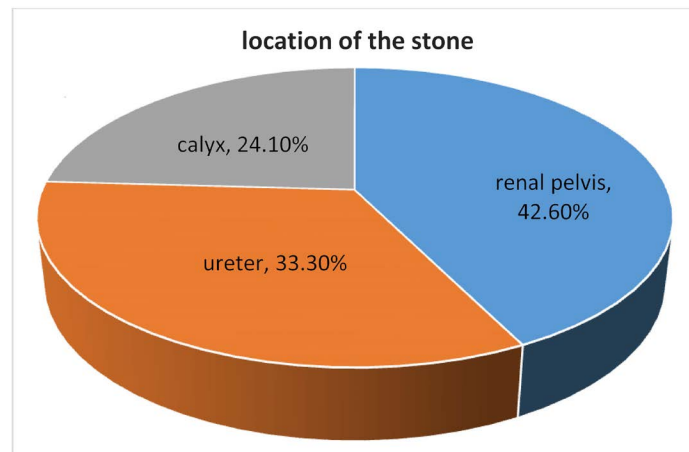


Figure 1. Distribution of patients by location of the stone.

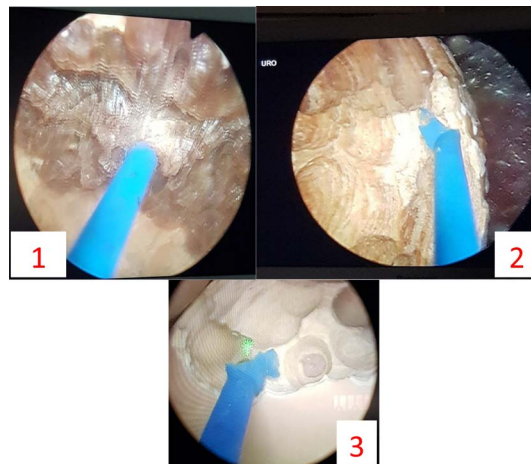


Figure 2. Nephrolithiasis found during Holmium laser ureteroscopic surgery sessions.

Table 1. Type of drainage.

Drainage	Frequency (n)	Percentage (%)
Ureteral Catheter	11	20
Double J Catheter	38	70.91
Without drainage	5	9.09
Total	54	100

The average drainage duration was one day for ureteral catheter and four weeks for double J catheter.

The average duration of hospitalization was 1.2 ± 0.73 days with extremes ranging from one day to 6 days.

All patients benefited from an X-ray and Ultrasound scan.

The overall success rate was 78.46% (**Table 2**). We noted 3 cases of residual stones in the inferior calyx around 7 mm size.

Any complication was noted.

4. Discussion

The limits of our study are the small sample size, the patient follow-up time and the absence of stone density. Despite these limits, the following comments or discussions may be made.

The lithiasis of developing countries was considered, until recently, as a particular lithiasis affecting mainly the young boy under five years of age and characterized by stones localized preferentially in the bladder [1]. The average age of patients in our series was 37.74 ± 17 years. Kaboré in Burkina regained a median age of 35 years [5]. This result was similar to recent literature data presenting urinary lithiasic disease as a condition of the young subject between the third and fourth decades [1].

As for the duration the intervention, it depends on the parameters of the stones (size, location), the quality of the ureteroscope for a good visibility, the right choice of laser parameters according to the nature of the stone but also and above all, the operator's experience.

Essodina Padja and collaborators [6] found an average intervention time of 73 min \pm 25 min for an average size of 13.78 mm \pm 5 mm. In our study, the average duration of the intervention was 77.92 ± 43.57 minutes. The durations reported in the literature are extremely variable but it usually takes 60 min to fragment a 10 mm stone [8].

Concerning the post-operative drainage, there is no consensus on the omission or the type of drainage to be carried out in post-operative. The data in favour of post-operative drainage are: an impacted stone, a long intervention time, lesion of the ureteral mucosa during the intervention, presence of fragments after the intervention, the operator's assessment and tendency.

In the literature the tendency is rather on short-term drainage by ureteral catheter or endoprosthesis [9].

In our series, we used catheter in 90.91% of cases.

Table 2. Free stone percentage.

Free Stones	Intervention (n)	Frequency (n)	Percentage (%)
First serial	54	43	79.62
Second serial	11	8	72.72
Total	65	51	78.46

Laser ureteroscopy is a modern approach to the treatment of renal and ureteral stones. Because of its endoscopic nature and because the lithotripsy takes place by vaporisation of contact holmium Laser, it responds to the treatment of all types of stone [10].

The indications of first-line laser ureteroscopy in the treatment of the upper urinary tract stones are well established by the lithiasis committee of the French Urological Association and other scholar companies [8].

Several authors have reported through their experiments the efficiency of Laser ureteroscopy in the treatment of stones and particularly stones less than 20 mm in diameter.

E. Lechevalier and Conort P. [11] [12] report an overall success rate for kidney stones between 65% and 85% and for ureteral stones between 75% and 90%. In P-O. Faïs's study, the success rate for upper calyces and the renal pelvis are from 60% to 100%, and from 60% to 80% for lower calyces [9].

Concerning M.A. Ben Saddik and his collaborators [7] who were interested in stones of 2 to 3 cm, their overall success rate was 63.1; 89.3% and 97.1% respectively after one, two and three laser flexible Ureteroscopy sessions. B. Fall and collaborators [13] report a global success rate of 71.7% in their series.

Essodina Padja and collaborators [6], the overall success rate was 78.91%. We have got an overall success rate of 78.46% for all stones. These results are comparable to those in the literature but it should be noted that the maximum size of the stones in our study was 25 mm. The factors determining the achievement of a no residual fragment were the size of the renal stone and the operator's experience.

We did not find any complication but some authors noted some complications.

A low rate of morbidity is associated with laser ureteroscopy in the treatment of kidney and ureteral stones. Recent studies report few major complications [14]. The literature reports an overall morbidity of ureteroscopy of 5% - 10% [10]. The risk of major complications (avulsion, perforation) is 1%. The risk of late complications is due to stenosis and is of the order of 1%. The risk of febrile infection after ureteroscopy is 2% - 18% [10]. Essodina Padja noted an overall complication rate of 14.46% and a single case (0.6%) of ureteral stenosis [6]. These low rates of complication support the idea that laser ureteroscopy is a grafted method with very little morbidity.

5. Conclusions

Laser ureteroscopy is a newly used method at Saint Camille Hospital. Our study, like those already published, shows that laser ureteroscopy is an effective and safe method in the treatment of kidney and ureteral stones.

The achievement of good results and its low morbidity encourage us to promote its extension and its use in other hospitals.

Consent

Consents of the patients were obtained before publication of this article.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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Renal Colic: Epidemiological, Clinical Etiological and Therapeutic Aspects at the Urology Department of the National Reference General Hospital of N'Djamena (Chad)

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Abstract

Introduction: Renal colic is a medico-surgical emergency in which complicated forms could progress to renal failure and nonfunctional kidney. The objective of our study is to describe the epidemiological, diagnostic and therapeutic aspects of renal colic at the urology department of the NGRH. **Methods:** This was a prospective study involving 101 patients followed up for renal colic. The study spanned from July 2015 to July 2016 at the urology department of the NGRH. **Results:** A total of 101 patients suffering from renal colic were enrolled in the study giving a prevalence of 5.1%. The mean age was 38.89 years with a standard deviation of 14.5 years and a sex ratio of 1:3. Flank or lumbar pain of crushing type (45.5%), constant and of severe intensity (61.4%) were the most frequent clinical characteristics. The plain abdominal radiography (Kidney-Ureter-Bladder) coupled with ultrasonography had a 100% sensitivity for the etiological diagnosis of renal colic. Urinary lithiasis was the most frequent cause with 73.3%. Uroculture revealed a urinary tract infection in 44 patients (43.6%). The most frequent germ isolated on the culture was *Escherichia coli* (27.7%). Renal function was abnormal in 34 patients (33.7%). Medical treatment was composed of analgesics, NSAIDs and antispasmodic representing 93.1%. Percutaneous nephrostomy was performed in 6.9%. Pyelolithotomy was the most frequently performed surgical procedure and was done in 11 patients that are 39.3%. Fifty seven patients (56.4%) got healed without sequelae; 6 cases (5.9%) of recurrence and 2

deaths (2%) were recorded. **Conclusion:** Renal colic is common in urology. Urinary lithiasis was the major cause in our series. Renal function could be endangered in case of late management.

Keywords

Renal Colic, Lithiasis, Bilharziasis, NGRH, Chad

1. Introduction

Renal colic is an acute flank or lumbar pain resulting from the sudden stretching of an obstructed pyelocalyceal system irrespective of the cause [1]. It usually results from urinary lithiasis. It is also frequent in patients received at the urology department. The prevalence of renal colic has been reported to be variable in Africa: in Senegal TOURE *et al.*, reported a frequency of 0.39% [2], while in Burkina Faso, Kambou *et al.*, reported 6.6% [3]. It has been reported that pains crises occur mostly during the dry season, and at night or very early in the morning [4]. The initial treatment must be done early and as an emergency before investigating the etiology [5]. It is a medico-surgical emergency. Renal colic could have major repercussions which could evolve towards renal failure, non-functional kidney or septicemia. The objectives of this study were to describe the epidemiological, clinical, etiological and therapeutic aspects of renal colic at the urology department of the NGRH.

2. Patients and Methods

It was a prospective and descriptive study carried out over a period of twelve months running from the 31st of July 2015 to the 30th of July 2016 at the Emergency and Urology Departments of the NGRH. A total of 101 cases were enrolled during the period of study. Included in our study, were patients who presented renal colic with an established diagnosis and treatment. Excluded in our study, were patients who presented lumbar pain not typical of renal colic. Study variables were age, sex, risk factor, antecedents, clinical characteristics of the pain, feeding habits, paraclinical (ultrasound-plain abdominal x-ray KUB, intravenous urography, computed tomography urography, urine culture with sensitivity tests and urinary sediment), emergency then definitive treatment, and postoperative follow-up. Data were collected and analysed using the SPSS 11.0 software. Calculations were done using proportions and mean, and statistical significance was considered with $\alpha = 5\%$.

3. Results

3.1. Epidemiological Data

3.1.1. Incidence

During the study period, we received 1946 patients at the urology department of

the NGRH among which 101 presented and were managed for renal colic giving an incidence of 5.1%. The distribution of age is shown in **Figure 1**. The mean age of our patients was 38.89 ± 14.5 years (range 17 to 72 years). The age range 21 - 40 years was mostly involved with 45 patients giving 44.6%.

Sex:

Majority of the patients were males; 57 men (56.4%) and 44 women (43.6%) with a sex ratio of 1:3.

3.1.2. Climatic Zone

More than half of our patients (59 patients that is 58.4%) lived in the sahelian zone (**Figure 2**), renal colic was observed throughout the year with a peak occurring in the hottest months: March, April and May representing 8.9%, 20.8%, and 35.6% of cases respectively. In our series, 64 patients (63.4%) lived in urban areas while 37 patients (36.6%) lived in rural areas.

Feeding habits of our patients composed essentially of milk and other dairy products (64 patients giving 63.4%), followed by cereals and red meat.

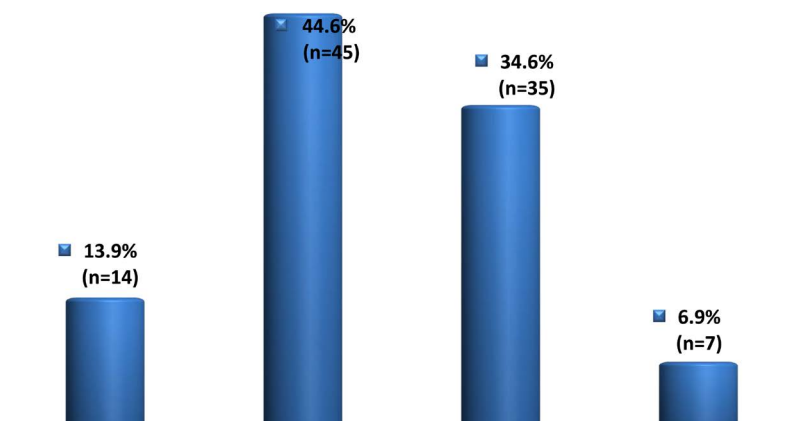


Figure 1. Distribution of patients according to age.

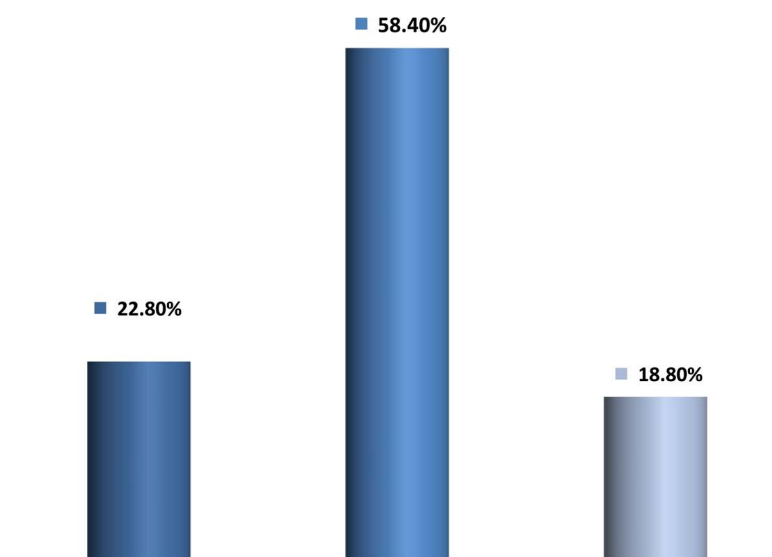


Figure 2. Distribution of patients according to the climatic zones of Chad.

3.2. Mode of Admission

Half of our patients came from the emergency department (51 patients that are 50.5%) (**Figure 3**). Majority of our patients presented unilateral lumbar pain (92.1%). Bilateral pain was less frequent in our study. Lumbar pain of crushing type (45.5%) and severe intensity, constant pain (61.4%) were the mostly encountered clinical characters. In our series, 74 patients (that are 73.8%) had experienced at least one episode of renal colic in the past. Chronic urinary tract infection was the urologic antecedent mostly reported (19 patients that are 18.8%).

3.3. Clinical Forms of Renal Colic

Simple renal colic occurred in 64 patients that are 63.4%, while 19 patients (18.8%) experienced extremely painful renal colic as depicted in **Table 1**. All patients did a urine culture and sediment. *E. coli* was mostly identified (28 patients that are 27.7%) followed by eggs of *Schistosoma haematobium* (7 patients that are 6.9%). Plain abdominal (KUB) X-ray was performed in 83.2% of patients, and revealed a radiopaque calculus in 45 of them giving 44.6%. Hydronephrosis from renal lithiasis was the abnormality mostly found on ultrasound and intra-venous urography representing 38.6% and 51.6% (16 patients) respectively.

3.4. Etiology

Urolithiasis of the upper urinary tract was the major cause of renal colic occurring in 74 patients (73.3%) followed by sequelae of bilharziasis with resultant

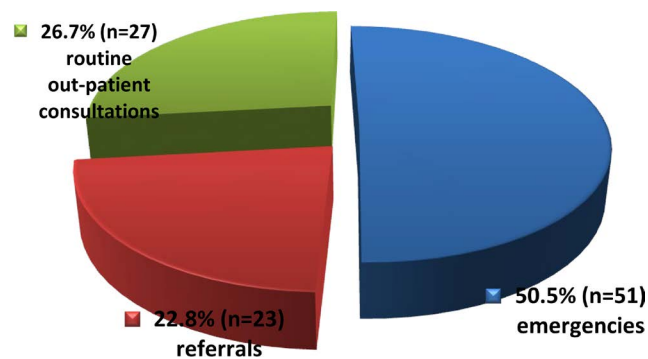


Figure 3. Distribution of patients according to the mode of admission.

Table 1. Distribution of patients according to forms of renal colic.

Clinical forms	N	%
Simple renal colic	64	63.4
Extremely painful renal colic	19	18.8
Febrile renal colic	8	7.9
Oligo-anuric renal colic	7	6.9
Renal colic in pregnancy	3	3.0
Total	101	100

ureteral stricture in 7%.

3.5. Treatment

3.5.1. Medical Treatment

During pain crisis, 73 patients (72.3%) were treated with NSAIDs + analgesics. Ultrasound-guided percutaneous nephrostomy (**Figure 4**) was performed as an emergency on 7 patients (6.9%).

3.5.2. Surgical Approach

In our series, 28 patients underwent surgery, and pyelolithotomy was the surgical technique mostly performed (11 patients giving 39.3%). Nephrectomy was done in 5 patients (17.9%) as depicted in **Table 2**.

3.6. Evolution and Complication

Out of the 28 operated patients, post-operative course was uneventful in 23 (82.1%). Complications were noted in 10 patients (35.71%): renal failure in 5 patients (17.86%), hyperalgetic pain in 3 patients (13.04%) and fever in 2 patients (7.14).

Of the 28 patients operated on, we noted 2 parietal suppurations, 2 cases of fever in post-operative care and 1 case of hyperalgesic pain. 23 patients (82.1%) had simple post-operative outcomes.



Figure 4. Ultrasound-guided bilateral nephrostomy (Urology Department of the NGRH, Chad).

Table 2. Distribution of patients according to surgical technique.

Surgical Technique	n	%
Pyelolithotomy	11	39.3
Nephrolithotomy	7	25.0
Ureterolithotomy	3	10.7
Ureterolithotomy + UVR	2	7.1
Nephrectomy	5	17.9
Total	28	100.0

4. Discussion

4.1. Epidemiological Data

4.1.1. Prevalence

In our study, 1946 patients were consulted of which 101 consulted for renal colic, giving a prevalence of 5.19%. This prevalence is comparable to that of the literature [1]. Our prevalence is statistically higher than that of LUJAN [6] in Spain, who reported 1.19%. These differences could be explained by the hot climate, dehydration, mode of recruitment of patients, and especially the fact that the urology department of the NGRH is the only competent department in Chad capable of managing patients with renal colic.

4.1.2. Socio-Demographic Data

1) Age

According to the literature, renal colic mostly affects men of 20 to 60 years age group [1]. Our mean age of 38.69 years corroborates with these data. MUSTAPHA [7] in Turkey mentioned a young adult of middle age, and reported 31.1 years. This preferential involvement of young adults could be explained by the fact that urinary lithiasis mostly forms during the period of high sexual activity, which diverts all attention towards uro-genital infections. The prevalence of bilharzia infestation is high in infancy, and urological sequelae such as ureteral stricture and bladder tumors only occur many years later [8].

2) Sex

In our study, we found a male predominance with a sex ratio (male/female) of 1:3. From the existing literature, most authors unanimously agree on a male predominance [6] [9]. This male predominance could be explained by the anatomy of the male uro-genital system, which is prone to urinary stasis, and the role of oestrogens in women, which causes solubilisation of calcium by eliminating citrate [10].

3) Month of occurrence

We received most patients in the months of March, April and May as follows 9, 21 and 36 patients respectively. These are the hottest months in Chad. From the literature, dehydration predisposes to formation of stones and calculi. It is therefore possible that renal colic frequently occurs during hot and dry months [11]. EVANS *et al.* [12] have reported a high prevalence of renal colic in American soldiers deployed in Kuwait, a very hot country.

In our study, 64 patients (63.4%) admitted to regularly consume milk and other dairy products. According to certain authors, milk is a risk factor for lithogenesis [11] [13].

4.2. Clinical Aspects

4.2.1. Presentation of Complain

Majority of our patients presented unilateral lumbar pain (92.1%). The bilateral character of pain in our study could be explained by the high incidence/frequency of sequelae from bilharziasis and uro-genital tuberculosis.

4.2.2. Urological Antecedents

Chronic urinary tract infection and urinary bilharziasis were the most common urological antecedents found at 18.8% and 6.9%, respectively. KAMBOU *et al.* [3], in Burkina Faso reported 7.27% for chronic urinary tract infection and 54.54% for bilharziasis. Uro-genital infection is a risk factor for the formation of stones which is a major cause of renal colic. The high prevalence of urogenital bilharziasis in our countries could explain the majority of renal colics occurring without lithiasis.

4.3. Paraclinical Aspects

Uroculture revealed a urinary tract infection in 43.6% of cases in our study, Kabore *et al.* [14] reported 45.3%. The variation in proportion of urinary tract infections in the different studies could be related to socio-economic conditions and access to health care. It is worth noting that *Escherichia coli* was the commonest germ in our study at 27.7%. Ultrasound/KUB x-ray and intravenous urography made the diagnosis of lithiasis, stricture and ureteropelvic junction obstruction (SUJO) in 100% since all the stones were radiopaque, and ultrasound showed ueretropyelocalyceal dilatation from strictures and SUJO. This sensitivity is comparable to PALMA [15], who reported 95%.

The coupling of ultrasound/KUB X-ray for the diagnosis of lithiasis or pyeloectasia improves the individual performance of these tests and both furnish each other with complementary information [1]. In our study, urinary lithiasis was the most common etiology, found in 74 patients (that is 73.3%), followed by ureteral stricture in 8 patients (that is 7.9%). According to the existing literature, 90% of renal colic are caused by urinary lithiasis [16]. Our data corroborate with the existing literature.

4.4. Therapeutic Aspects

4.4.1. Medical Treatment

In our series, 73 patients (72.3%) were treated medically. The remaining 28 patients (27.7%) underwent surgery. It should be noted that most patients had micro-lithiasis of less than 6 mm in diameter. In our study, the mostly prescribed medical treatment consisted of a combination: NSAID + analgesic in 59 patients (that is 58.5%). This corresponds to the recommendations of the 1999 consensus conference of the SFMU (Societe Francaise de Medecine d'Urgence), which recommends the prescription of NSAIDs except contra-indications associated with a first or second class analgesic depending on the intensity of the pain [5].

4.4.2. Surgical Treatment

Open surgery was performed in 28 patients (that are 27.7%) using different techniques. Pyelolithotomy was performed in 11 patients (that are 39.3%). This could explain the fact that open surgery still plays a major role as a means of stone extraction in developing countries. In most of these developping countries, sophisticated stone extraction techniques (ESWL, ureteroscopy, percutaneous

nephrolithotomy [PCNL]) or other therapeutic approaches depending on the cause of renal colic are lacking.

4.5. Evolution

In our study, 57 patients (that are 56.4%) healed without sequelae. TISELIUS [17] reported a higher success rate of 70% to 80%. These differences could result from differences in technical platform as he used minimally-invasive surgery.

Thirty-three patients (that is 32.7%) were lost to follow-up. This could account for the difficulty in follow-up and management of patients in our setting. Three patients left the hospital against medical advice, and two died.

4.6. Limitations of Our Study

The retrospective nature of our work was a limitation of this study, due to the insufficient follow-up of medical files. Some files could not be found, and among those found others were damaged. The information provided in the files was insufficient (summary clinical examination, history and long-term follow-up). The long-term evolution could not be assessed in any of our patients due to either insufficient records or the loss of sight of patients who did not return for follow-up consultation.

5. Conclusion

Renal colic is a common presented complain urology. Urinary lithiasis is a major etiology; but special attention should be placed on urinary schistosomiasis whose sequelae are a second leading cause. Treatment must be initiated early to prevent complications; however, modern techniques such as endoscopy and double Catheter stenting should be used to improve on the management of complicated forms of renal colic.

Conflicts of Interest

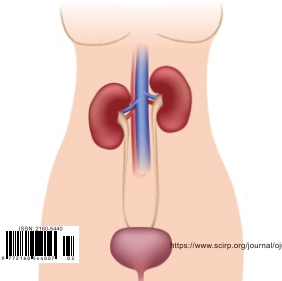
The authors declare no conflicts of interest regarding the publication of this paper.

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