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The Epidemiological-Clinical and Therapeutic Aspects of Lithiasis of the Lower Urinary Tract in the Urology Units of the Reference Health Centers of Commune I of Bamako and Nioro Du Sahel

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Abstract **Original Research Article**

Objective: report the epidemiological-clinical and therapeutic aspects of lithiasis of the lower urinary tract in the reference health centers of commune I of Bamako and Nioro du Sahel. ***Patients and Methods*:** This is a descriptive study with cross-sectional data collection, carried out in the urology units of the reference health centers of commune I of Bamako and Nioro du Sahel in Mali from May 1 2020 to May 1, 2023 (36 months). ***Results*:** Lower urinary tract lithiasis constituted 41.13% of all urolithiasis and 3.5% of all surgical activities in the department. The average age of the patients was 28 years (2; 67 years). The most represented age group was that between 0 and 10 years old with 34.86% of cases. The male gender was the most affected with 89.91% of cases. The most represented socio-professional categories were: farmers (45.87% of cases) followed by pupils/students (38.53%). The majority of our patients had consulted for hypogastric pain (5 3.21%). The history was dominated by urinary bilharziasis in 24.77% of cases. On physical examination, a bladder globe was present in 23.85% of cases. A urinary infection was found in 43.12% of patients, Escherichia Coli was the most common germ (12.84%). Ultrasound of the urinary tree was performed in 96.33% of patients. The bladder location was the most common with 88%. All patients underwent conventional surgery and the etiological treatment was carried out at the same time. The outcome was favorable with simple operative outcomes in 92.66% of cases. Complications were marked by 5 cases of parietal infections, 2 cases of vesicocutaneous fistulas and one case of death. ***Conclusion*:** Lithiasis of the lower urinary tract is more common in patients aged 0-10 years. Its curative treatment involves cystolithotomy associated with the treatment of the causative disease.

Keywords: Epidemiological-Clinical, Lithiasis, Lower Urinary Tract.

INTRODUCTION

Urolithiasis is the presence of stony concretions on the urinary tract. It is a pathological situation which is relatively common in certain parts of the world, especially in developing countries.

Its prevalence varies from one area to another, between 7 and 13% in North America, 5 and 9% in Europe and 1 to 5% in South-East Asia with stone-endemic areas such as the South-East of Turkey [3]. The location on the urinary tract is also variable, more common on the upper urinary tract in developed countries and on the lower urinary tract in developing countries [4]. Lower urinary tract lithiasis is found in all socio-economic levels, especially among the low-income population. In the West, lithiasis of the lower urinary tract, which was frequent and mainly bladder-related, has almost disappeared today with the improvement in the living conditions of populations. In Africa, lower urinary tract lithiasis is a public health problem due to the low standard of living of the

populations and the existence in most of our countries of a hot and dry climate responsible for dehydration [5]. Lower urinary tract lithiasis generally occurs in a context of obstruction of the lower urinary tract both in children (delay in diagnosis of the valves of the posterior urethra) and in adults (prostatic pathology, urethral stenosis, disease of the bladder neck, neurological bladder). When the diagnosis is made late, renal destruction can follow. In Mali, few studies have been carried out and published on stone disease of the lower urinary tract. This is how we proposed to carry out this study which aims to evaluate the epidemiological-clinical and therapeutic aspects of lithiasis of the lower urinary tract in the urology units of the reference health centers of the commune I of Bamako and Nioro of the Sahel.

PATIENTS AND METHODS

This is a descriptive study with cross-sectional data collection, carried out in the urology units of the reference health centers of commune I of Bamako and Nioro du Sahel from May 1, 2020 to May 1, 2023 (36 months).

All patients admitted and treated for lithiasis of the lower urinary tract during the study period and having a complete medical file were included in the study.

All patients who did not benefit from treatment or who refused to join the study and those who had an incomplete medical file were not included in the study. The results were judged with an average follow-up of 12 months. The evolution was considered favorable given the disappearance of the clinical, radiological and/or ultrasound signs of lithiasis of the lower urinary tract. The variables studied were age, sex, contributing factors, history, clinical and paraclinical characteristics (radio ultrasound of the pelvis, UCR), anatomical location of the lithiasis, treatment and postoperative follow-up. The data were processed and analyzed using Excel 2017 and IBM SPSS statistics 21 software. The significance threshold for statistical tests was set at $p \leq 0.05$ and the confidence intervals at 95%.

RESULTS

During the study period, 109 cases of lower urinary tract lithiasis were collected out of a total of 265 cases of urolithiasis, representing a frequency of 41.13%. Surgery for lithiasis of the lower urinary tract constituted 3.5% of all surgical activities in the department (n=3112). The average age of the patients was 28 years with extremes ranging from 2 to 67 years. The male gender was the most affected with 89.91% of cases. The most represented age group was that between 0 and 10 years old with 34.86% of cases. Details are recorded in Table I.

Table I: Distribution of patients according to age and sex

Gender	**Male**	**Female**	**Total**
Age			
0-10	**37**	**1**	**38**
11-20	13	0	13
21-30	5	0	5
31-40	3	1	4
41-50	10	6	16
51 years and over	30	3	33
TOTALS	**98**	**11**	**109**

Farmers were the socio-professional categories most represented with 45.87% of cases followed by pupils/students (38.53%).

The majority of our patients had consulted for hypogastric pain (5 3.21%). The symptomatology of lower urinary tract lithiasis was variable, several functional signs which motivated the consultation could be found in the same patient as indicated in Table II.

Table II: Distribution of patients according to reason for observation

Reason for consultation	**Number (n)**	**Percentage (%)**
Hypogastric pain	**58**	**5 3,21**
Dysuria	44	40,36
Pollakiuria	14	12,84
Acute bladder urine retention (AUR)	26	23,85
Terminal hematuria	11	10,1
Pyuria	8	7,34
Perception of a mass in the penis	9	8,25
Urinating urgency	3	2,75

The antecedents were dominated by urinary schistosomiasis in 24.77% of cases followed by recurrent urinary infections in 16.51% of cases and associated urinary malformations (posterior urethral valve) in 5.5% of cases.

On physical examination, lithiasis was palpable in 11.01% (n=12) of cases. A bladder globe was present in 23.85% (n=26) of cases, prostatic hypertrophy was found on rectal examination in 19.26% of patients and 7 patients had a cystocele.

Paraclinical examinations: ECBU was performed in all our patients with 43.12% cases of urinary infection found (table III). Creatinemia, serum calcium and serum uric acid were carried out, apart from 4 cases of hyper creatinemia, the other tests had no abnormality.

The imaging examinations carried out were ultrasound of the urinary tree in 96.33% (n=105) of cases, radiography of the abdomen without preparation in 59.63% of cases (n=65). A retrograde and voiding urethrocystography (UCRM) was performed in 25 patients (22.93%) At the end of the assessment, the main location of lithiasis of the lower urinary tract was in the bladder (88%) (Figure I)

The location of lithiasis is indicated in figure I

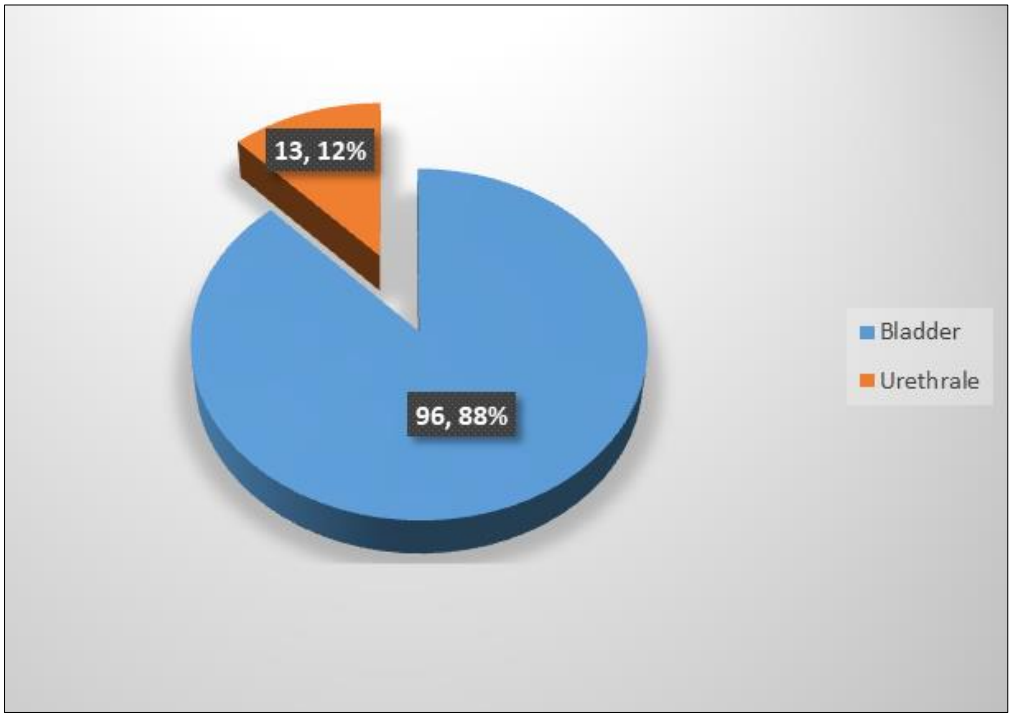

Figure I: location of lithiasis

Table III: Distribution of patients according to germs found at ECBU.

Germs found Numbers	Numbers **(n)**	**Percentage (%)**
Escherichia Coli	**14**	**12,84**
Klebsiella pneumoniae	7	6,42
Protéus mirabilis	11	10,09
staphylococcus aureus	4	3,67
Enterococcus sp	5	4,58
Pseudomonas aeruginosa	6	5,5
Absence of germ	62	56,88
Lime oxalate crystals	6	5,5
Calcium oxalate crystals	13	11,92

Escherichia Coli was the most common germ (12.84%). The etiological factors were dominated by prostatic hypertrophies (19.26%) (Figure II)

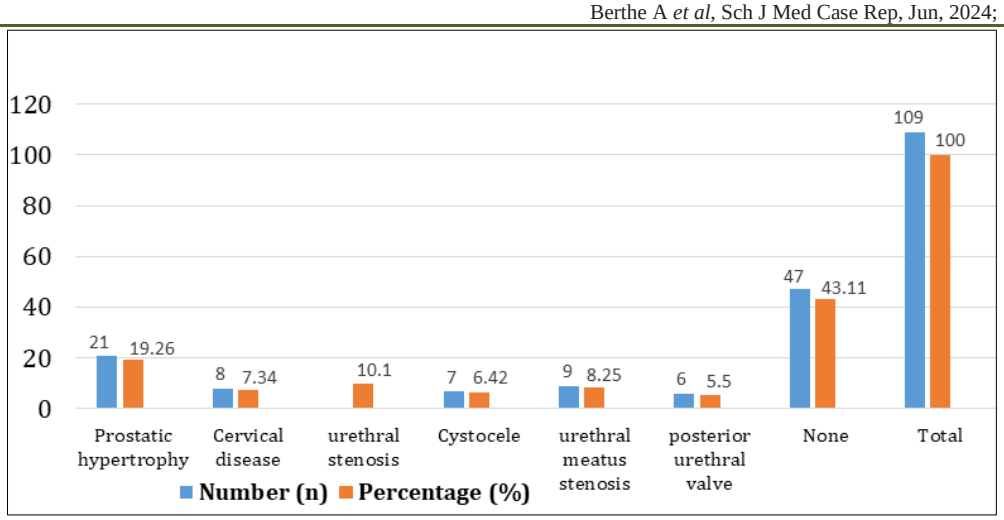

Figure II: etiological factors

The treatment consisted of a cystolithotomy in 43.11% (n=47) of the cases, a trans-vesical adenomectomy of the prostate associated with a cystolithotomy in 19.26% (n=21) of the cases, a meatoplasty associated with a instrumental extraction of the lithiasis in 8.25% of cases, backflow of the lithiasis into the bladder then cystolithotomy in 4 patients. A cervicotomy, a urethroplasty, a cystocele cure, a crushing of the valve by stripping associated with a cystolithotomy in respectively 7.34%; 10.1%; 6.42% and 5.5% of cases.

The outcome was favorable with simple operative outcomes in 92.66% of cases. Complications were marked by 5 cases of parietal infections and 2 cases of vesicocutaneous fistulas, all managed successfully. A 56-year-old obese patient with heart disease was transferred to cardiology where she died of a stroke. Overall, urination was considered satisfactory after 12 months.

DISCUSSION

During the study period, we hospitalized 3112 patients for various pathologies including 265 cases of urolithiasis, of which 109 were lithiasis of the lower urinary tract. Lower urinary tract lithiasis therefore represented 41.13% of all urolithiasis and 3.5% of the department's surgical activity. Similar frequencies were reported by I. Bah *et al*., [6], in Guinea and M. Ali Mahamat *et al*., [7], in Chad who obtained 4% and 3.8% respectively. A higher frequency was reported by Joual *et al*., [8], in whom lithiasis of the lower urinary tract represented the second cause of hospitalization in their department with 21%. The location of the lower urinary tract seems more common in developing countries [9]. Our hot and dry climate with temperatures very often exceeding 40°C for a good part of the year could favor lithogenesis as in endemic countries such as Saudi Arabia where the prevalence in the general population reaches 20% [10]. With 34.86% of cases, lithiasis of the lower urinary tract was more frequent in subjects aged 0 and 10 years in our series. The average age of the patients was 28 years with extremes ranging from 2 to 67 years. This average age was comparable to that of VERIT *et al*., in Turkey [11], and lower than that of I. Bah *et al*., [6], in Guinea who reported 26.2 years and 33 years respectively.

The male sex was the most affected with 89.91% of cases as in the series by VERIT *et al*., in Turkey [11], CISSE. D *et al*., [4], in Mali, M. Ali Mahamat *et al*., [7], in Chad. The anatomical hypothesis of the shorter and wider female urethra would protect them from lithiasis of the lower urinary tract.

With 45.87% of cases, farmers were the socio-professional category most represented in our series as in the Guinean series with I. Bah *et al*., [6]. Activities that expose you to heat and insufficient hydration increase the risk of lithogenic diseases. The impact of high temperature on the genesis of urolithiasis has also been demonstrated among workers in overheated environments such as in the steel industry [12].

The reasons for consultation were dominated by hypogastric pain with 5 3.21% of cases followed by Dysuria (40.36%). Hypogastric pain was also the main reason for consultation in the study by I. Bah *et al*., with 47% [6]. In the series by M. Ali Mahamat *et al*., [7] and Jallouli *et al*., [13], dysuria was the main reason for consultation with 50% and 38.28% respectively. Mechanical and inflammatory phenomena linked to lithiasis could explain hypogastric pain.

The pathological history was dominated by urinary bilharzia in 24.77% of cases followed by recurrent urinary infections in 16.51% of cases. Mali being located in a bilharzial endemic area, bilharzal cystitis is common especially in children aged 7-10 years old. This could explain on the one hand the high frequency of lithiasis of the lower urinary tract in the 0-10 age group. Years and the history of bilharziasis in this study on the other hand. In the Koko series. J [14], in

Gabon, urinary bilharziasis constituted 33.3% of the pathological history.

The physical examination made it possible to palpate a bladder globe in 23.85% of cases, prostatic hypertrophy in 19.26% of cases and urethral lithiasis in 11.01% of cases. The high frequency of obstructive etiologies (prostatic hypertrophy, urethral stenosis, posterior urethral valve, bladder neck disease) in our series could explain the frequency of the bladder globe in the physical examination.

Paraclinical Examinations

ECBU

Urine examination was carried out in all our patients with 43.12% cases of urinary infection. Escherichia Coli was the most common germ (12.84%) followed by Proteus mirabilis (10.1%) and Klebsiella pneumoniae (6.42%). Our proportion of urinary infections was lower than that of Danaï A *et al*., [17], in Benin (86.6%) with E. coli as the main causative organism. I. Bah *et al*., [6], reported a proportion of 13.51% and Staphylococcus aureus was in the lead. Urolithiasis promotes the occurrence of urinary infections and vice versa.

Creatinemia, serum calcium and uric acid were carried out, apart from 4 cases of hyper creatinemia the other examinations had no abnormality. The imaging examinations carried out were ultrasound of the urinary tree in 96.33% of cases, abdominal radiography without preparation (59.63%), urethral retrograde and voiding cystography (UCRM) performed in 25 patients (22.93%). Whenever lithiasis was evident on ultrasound, radiography was not done. These examinations not only made it possible to make the diagnosis of lithiasis, but also to confirm the existence of subbladder pathologies suspected on clinical examination, in particular prostate hypertrophy, urethral strictures, cervical disease, the posterior urethral valve. In the study by Mr. Ali Mahamat *et al*., [7], radiography of the pelvis helped to make the diagnosis in 95.38% of cases and ultrasound in 88.46% of cases.

The main location of lower urinary tract lithiasis in our series was the bladder (88%, n=96). A similar result was obtained by several authors notably by Odzebe A.S.W *et al*., (69.1%) [15], in Congo Brazzaville, M. Ali Mahamat *et al*., [7], in Chad and I. Bah *et al*., [6], in Guinea with respectively 69.1%, 74.6%, 91.89% bladder localization.

In man, urinary stasis is the essential factor in the formation of bladder stones. This urinary stasis is often the consequence of: either a subbladder obstruction; or a neurological dysfunction. The origin of the calculation is controversial. For some, the core of the bladder stone comes from the kidney and then grows in the bladder. For others, the stone has a bladder origin: lithogenic factors increase the secretion of mucopolysaccharides by the urothelium which would serve as a matrix for the future stone [16, 17].

In our series, open surgery was the only therapeutic modality due to the lack of minimally invasive means. Treatment consisted of cystolithotomy associated with treatment of the cause in all our patients. Our results are comparable to those of I. Bah [6], in Guinea and M. Ali Mahamat *et al*., [7], in Chad. The outcome was favorable with simple operative outcomes in 92.66% of cases. Complications were marked by 5 cases of parietal infection and 2 cases of vesicocutaneous fistulas, all managed successfully. Overall, urination was considered satisfactory after 12 months.

CONCLUSION

lithiasis of the lower urinary tract is quite common in our practice. It is mainly of interest to patients aged 0-10 years. Its curative treatment involves cystolithotomy associated with the treatment of the causative disease. Prevention of lower urinary tract lithiasis is based on early diagnosis and management of subvesical pathologies.

Conflicts of Interest: The authors declare that they have no conflicts of interest in relation to this article.

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