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Review Article

Management of Urinary Lithiasis in Children in the Urology Department of the Ignace Deen University Hospital in Conakry

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Abstract

Introduction: Urinary lithiasis in children is less common than in adults. Its etiologies are dominated by malformations of the urinary system and hereditary diseases. The objective of this study was to analyze the epidemiological, diagnostic and therapeutic particularities of urinary lithiasis in children in the urology department of the Ignace Deen University Hospital in Conakry. Methodology: This was a descriptive, retrospective, single-center study conducted over a period of 10 years, which concerned children aged 0 to 15 years, operated for urinary lithiasis in the urology department of the Ignace Deen University Hospital in Conakry. Results: Urinary lithiasis in children represented 19.2% of cases of lithiasis operated in the department. The average age of patients was 8.43 ± 5.13 years with extremes of 1 and 15 years. The male predominance was very marked with a sex ratio of 9.3. Dysuria was the most frequent symptom in 90.3% of cases. The stones were mainly located in the lower urinary tract (64.5%) with a predominance of the bladder location. All our patients had benefited from open surgical treatment. The postoperative course was favorable in 51 cases (82.3%), against 11 cases of postoperative complications (17.7%). The average hospital stay was 11.8 ± 4.9 days with extremes of 6 and 32 days. Conclusion: Urinary lithiasis in children represents a significant part of the department's activity. Lower urinary tract lithiasis is the most frequent in our context. Ultrasound and urinary tract without preparation occupy an important place in the diagnostic assessment. Minimally invasive treatment methods for childhood stones remain unavailable in the department.

Keywords

Urinary Lithiasis, Children, Bladder Stones, Ultrasound, Open Surjery

1. Introduction

Urinary lithiasis is a pathological entity with diverse etiologies, recurring in more than 60% of cases [1]. Thus, it must lead to a thorough etiological investigation due to the risk of recurrence and impaired renal function [2, 3].

In children, the etiologies of urinary lithiasis are dominated by urinary tract malformations and hereditary diseases [4]. It

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is often revealed by urinary tract infections, abdominal pain, or hematuria, and rarely by renal colic [5].

Due to their high potential for recurrence and their significant morbidity, urinary lithiasis in children can be responsible for school absenteeism.

Urinary lithiasis in children is less common than in adults, although its incidence has increased in recent decades. This makes it a real public health problem [6, 7].

In 2018, Menard [7] recorded a 3.5% rate of urinary stones in children under 10 years of age in a study on the epidemiology of urinary stones in southern France.

In 2010, Sow [8] reported 20 cases of urinary stones in children over a 5-year period at the Aristide Le Dantec University Hospital in Dakar.

In Guinea in 2009, in a study on lower urinary tract stones, Bah [9] found 35% of cases in children. In another study on upper urinary tract stones, Diallo [10] reported 3.8% of patients under 15 years of age.

The objective of this work was to analyze the epidemiological, diagnostic and therapeutic particularities of urinary lithiasis in children in the urology department of the Ignace Deen University Hospital in Conakry.

2. Material and Methods

This was a descriptive, retrospective, single-center study conducted over a 10-year period, from January 1, 2014, to December 31, 2023. It involved children aged 0 to 15 years who underwent surgery for urolithiasis in the Urology Department of the Ignace Deen University Hospital in Conakry.

We identified all records containing details of the clinical examination, an imaging study revealing the stone, and a surgical report of the treatment performed.

Data were collected using a questionnaire containing clinical (age, sex, reasons for consultation), paraclinical (urine culture, metabolic assessment, and imaging), and therapeutic (procedure performed, postoperative course) variables.

A descriptive data analysis was performed using SPSS version 25 software. Quantitative variables were described by the mean and standard deviation for those following a normal distribution, and by the median where appropriate. Qualitative variables were described with proportions.

3. Results

During our study, 62 cases of childhood urolithiasis were identified out of a total of 323 cases of urolithiasis operated on in the department, representing 19.2% of cases.

The mean age of the patients was 8.43 ± 5.13 years, with a range of 1 to 15 years. The distribution of patients by age is presented in Table 1.

Table 1. *Distribution of patients by age group.*

Age group (years)	Effective	Percentage
0 – 5	25	40.3%
6 – 10	14	22.6%
11 – 15	23	37.1%
Total	62	100%

We recorded 56 boys (90.3%) and 6 girls (9.7%), corresponding to a sex ratio of 9.3.

Found in 56 patients (90.3%), dysuria was the most common symptom, followed by abdominal pain in 30 cases (Table 2).

Table 2. *Distribution of patients according to reasons for consultation.*

Reasons for consultation	Effective (N=62)	Percentage
Dysuria	56	90.3%
Lower back pain	30	48.4%
Pollakiuria	29	46.8%
Burning when urinating	24	38.7%
Hematuria	14	22.6%
Bladder urinary retention	12	19.3%

A history of recurrent urinary tract infection was found in 24.2% of patients (n=15).

Urine culture performed on all patients isolated a urinary tract infection in 24 cases (38.7%). The isolated organisms were *Escherichia coli* and *Staphylococcus aureus* in 66.7% and 33.3% of cases, respectively.

Metabolic assessment detected hyperphosphatemia in 12 cases (19.4%), hypercalcemia in 8 cases (12.9%), and acidic urinary pH in 2 cases (3.2%). Overall renal function was impaired in 12 patients, or 19.4% of cases.

Ultrasound and unprepared urinary tract were the most frequently requested imaging examinations, either in isolation in 35 cases (56.5%) and 17 cases (27.4%) respectively, or in combination in 7 cases (11.3%). CT scan was performed in 10 cases (16.1%).

A total of 76 stones were identified in the 62 patients. The stones were single in 52 cases (83.9%), double in 6 cases (9.7%), and triple in 4 cases (6.5%). Dilation of the upper urinary tract was found in 16 cases (25.8%).

The majority of stones (76.57%) were located in the lower urinary tract (Table 3).

Table 3. Distribution of stone according to seat.

Topography		Effective (N=76)	Percentage
Upper urinary tract	Calyx	12	15.3%
	Pyelon	11	14.5%
	Ureter	4	5.3%
Lower urinary tract	Bladder	45	59.2%
	Urethra	4	5.3%

Therapeutically, all patients underwent open surgical treatment. Stone extraction techniques are presented in Table 4. A total of 64 stones were extracted. Therapeutic abstention was observed for 12 non-obstructive calyceal stones. Removal of pyelic stones was associated with the insertion of a JJ catheter in 5 patients.

Table 4. Distribution of stone extraction techniques.

Extraction techniques	Effective (N=62)	Percentage
Cystolithotomy	45	72.6%
Pyelolithotomy	10	16.1%
Ureterolithotomy	3	4.8%
Flush + Cystolithotomy	3	4.8%
Meatolithotomy	1	1.6%

The postoperative course was favourable in 51 cases (82.3%), compared to 11 cases of postoperative complications (17.7%), including surgical site infections (6 cases) and urinary fistulas (5 cases).

The mean hospital stay was 11.8 ±4.9 days, with a range of 6 to 32 days.

After a mean follow-up of 2.3 months, the outcome was satisfactory in all patients, with resolution of symptoms and no residual stones, except for calyceal stones that were under surveillance.

4. Discussion

Childhood urolithiasis remains understudied in our healthcare facilities. The retrospective nature of our study limits it due to poor record keeping.

Childhood urolithiasis is less common than in adults, accounting for 19.2% of all urolithiasis treated in our department.

This lower incidence compared to adults is not fully explained but may be related to a higher concentration of inhibitors in children, such as citrate, magnesium, and certain macromolecules [11].

Furthermore, the delay in consultation in our setting means that some childhood urolithiasis may be diagnosed in adulthood.

Root stones are often discovered in early childhood, with 20% occurring before the age of 2 and 50% before the age of 5 [11]. In our study, 40.3% of patients were 5 years or younger. On the other hand, Routh [12] and Oussama [13] found a predominance in older children.

The male predominance was very marked in our series, with a sex ratio of 9.33. This corroborates the data of several studies carried out in the sub-region and in the Maghreb [14-16]. This predominance would be due to an anatomical predisposition of the urethra, which is long in boys, unlike in girls, in whom the shortness of the urethra with a large caliber facilitates the elimination of small stones [17].

The symptomatology of urinary stones in children is often less typical than that of adults. Highly variable and independent of the physicochemical nature of the stone [18], it depends mainly on the location of the stone. Thus, dysuria, which is indicative of lower urinary tract stones, was found in 73.4% of cases. Mahamat [17], in a study on renal gallstones, reported 50% dysuria as a reason for consultation.

Painful symptoms were observed in 48.4% of cases in our series. The pain is usually abdominal or pelvic. Often intense but difficult to localize, it can be a sign of emergency digestive surgery [4]. Classic renal colic is rare in children and is observed from the age of 15 [4].

Urinary tract infection, frequently associated with the presence of stones, was found in 38.7% of cases in our series. The most common germ was Escherichia coli, accounting for 66.6% of cases. Alaya [2] and Mahamat [17] found the same germ in 57.3% and 53.3% of cases, respectively. Urinary tract infection is either a contributing factor or a complication of renal gallstones [19]. The authors are unanimous regarding the systematic search for a urinary infection and its treatment before any treatment of lithiasis [20].

CT scan, which has a sensitivity and specificity between 96 and 100% [21], was only performed in 16% of cases due to its high cost in our setting and the radiation it could deliver in children.

The combination of ultrasound and urinary tract without preparation remains a good alternative to CT scan. It offers a sensitivity of 80 to 90% for the diagnosis of stones and obstruction with significantly less radiation than CT scan [4, 5].

Ultrasound was the most commonly performed examination in our study and was sufficient alone to detect stones in 56.5% of cases. This is in contrast to Sow [8], who reported that urinary tract without preparation was the most commonly performed examination in 65% of cases in their series.

In the literature, lower urinary tract stones are the most common in developing countries [15]. They represented 76.5% of cases in our series. In the West, they have virtually disappeared today with the improvement in living conditions.

Extracorporeal lithotripsy currently represents the standard treatment option for stones in children [4]. General anesthesia is necessary in young children to better control pain, anxiety, and movement during the session [4].

Lottmann [22] showed that extracorporeal lithotripsy was particularly effective in young children, whose stones are more friable due to their lower degree of calcification, and their more compliant excretory pathway allows proportionally larger fragments to pass than in adults. The results of extracorporeal lithotripsy for coralliform stones are highly dependent on the age of the children. While poorly calcified coralliform stones in infants are effectively treated with extracorporeal lithotripsy, this is not the case for older children, where the combination of percutaneous nephrolithotomy and extracorporeal lithotripsy is preferred. In our study, conventional surgery remains the only surgical treatment for pediatric urinary stones, due to the lack of minimally invasive stone treatments in the department. The same problems are mentioned by Copelovitch [23] regarding pediatric urinary stones.

In France, conventional surgery has been replaced over the past twenty years by minimally invasive techniques [4], which offer advantages in terms of reduced operative morbidity and shorter hospital stays.

The hospital stay was significant in our series, averaging 12 days. This could be explained by the postoperative complications we recorded in 17.7% of cases. Urinary fistulas often take time to dry up.

Despite this significant morbidity of conventional surgery, long-term treatment results are satisfactory in the majority of cases, with no residual stones in our series.

5. Conclusion

Urinary stone disease in children, although less common than in adults, represents a significant portion of the department's activity.

It mainly affects children under five years of age, with a strong male predominance. Lower urinary tract stones are the most common in our setting and often present with dysuria. Ultrasound and less irradiating urinary tract without preparation offer a good alternative to CT scan, which remains very expensive in our setting. Conventional surgery remains the only treatment for childhood stones in our department, resulting in a longer hospital stay.

It is becoming essential to introduce minimally invasive treatment methods for childhood stones in the very near future to minimize postoperative morbidity and reduce hospital stays.

Conflicts of Interest

The authors declare no conflicts of interest.

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