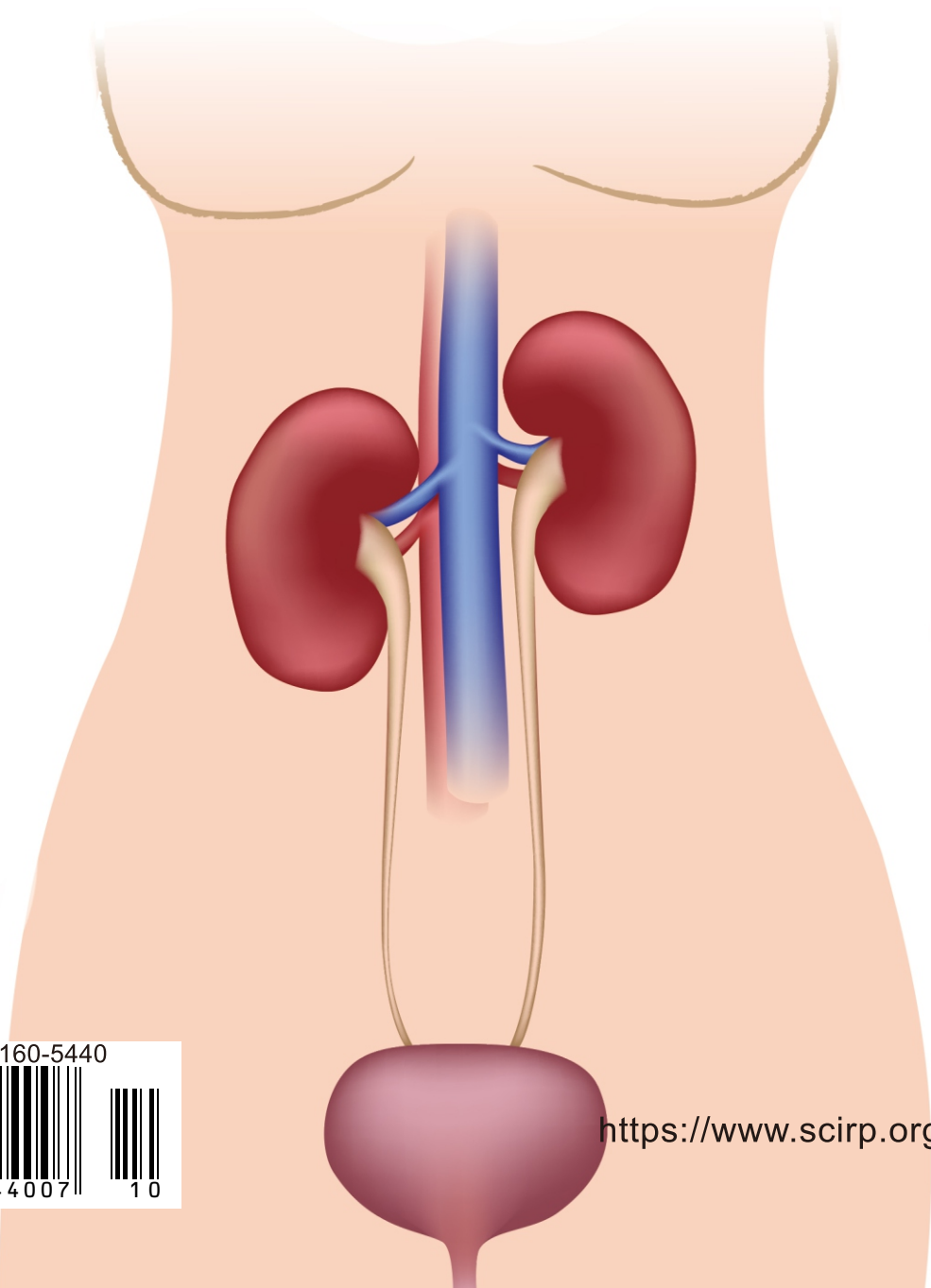


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Urogenital Trauma: Epidemiological and Diagnostic Aspects at the Borgou University and Departmental Hospital Center (Benin)

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Abstract

Objective: To study the epidemiological and diagnostic aspects of urogenital trauma at the Borgou University and Departmental Hospital Center. **Material and Methods:** This was a descriptive cross-sectional study that took place over a period of 4 years and 4 months (52 months) from January 1st 2017 to April 30th 2021. All cases of urogenital trauma treated in the General surgery department during the period were collected. Patient records, hospitalization registers and operating reports were used to collect information. Data entry was done using Epi data 3.1 software, French version. The analysis was performed using MedCalc software (version 19.4.1. Mariakerke, Belgium), and Epi info software version 7. **Results:** In 52 months, 75 cases of urogenital trauma were collected. The prevalence of urogenital trauma was 1.1% of admissions with an annual incidence of 17.3 cases. The modal age class was [20; 40], *i.e.* 49.3%. Males accounted for 76.0% (n = 57) of cases. Urethral and kidney injuries were found in 33.3% and 21.3%, respectively. The external genitalia was involved in 24.0%. Road traffic accidents occupied the first place with 62.6%. Kidney lesions were revealed by lumbar pain in 62.5% (n = 10) and post traumatic hematuria in 25% (n = 4) of cases. Most of the patients (n = 8, *i.e.* 50%) were classified as grade I according to the AAST classification. **Conclusion:** Urogenital trauma is common in our environment and can be life-threatening. Knowledge of their epidemiology will allow for prevention and good management.

Keywords

Urogenital Trauma, Epidemiology, Diagnosis, Benin

1. Introduction

Urogenital tract lesions are open or closed lesions resulting from injury to the urinary and/or genital tract [1]. In the countries judged, they represent 8% to 10% of all injuries [1] [2]. Its prevalence is underestimated in Africa and is less than 1% [3]. Epidemiological data on urogenital trauma are rare in sub-Saharan Africa [2] [3] [4]. These lesions may involve the kidney, ureters, bladder and urethra, sometimes the external genitalia. Urethral lesions are the most followed by kidney and bladder lesions [3]. In the event of traumatic rupture of the urethra, the clinical picture is that of complete post-traumatic bladder retention [4]. Kidney trauma most often occurs in a context of polytrauma. A renal lesion must be suspected in the event of a fracture of the last ribs, whether or not associated with hematuria [3] [4]. The constant increase in the demography of the city of Parakou since the creation in 2001 of the University of Parakou justifies the high frequency of road traffic accidents and particularly urogenital trauma. This study was initiated with the aim of evaluating the place of urogenital trauma in the general surgery department of the Borgou University and Departmental Hospital Center (CHUD-B).

2. Patients and Methods

This is a descriptive cross-sectional study that took place over a period of 4 years 4 months (52 months) from January 1, 2017 to April 30, 2021, in the general surgery department of CHUD-B. The study population consisted of all patients admitted for clinical, radiological or intraoperative discovery of urogenital trauma. Was considered to have a urinary tract lesion any patient victim of a trauma with or without a urinary warning sign (haematuria, lumbar pain) in whom imaging (ultrasound, CT) confirms renal damage. Genital lesions were evoked in the presence of pain in the genital organs with an increase in volume in a traumatic context, confirmed or not by imaging or intraoperative observations. A pre-designed survey form was used to enhance the information. The variables were clinical (nature of trauma, clinical and paraclinical signs) and sociodemographic (Age, sex, ethnicity, profession and origin). Data entry was carried out in an input mask designed and structured using Epi data 3.1 software, French version. The analysis was performed using MedCalc software (version 19.4.1. Mariakerke, Belgium), and Epi info software version 7. For descriptive statistics, we calculated numbers and their proportions (relative frequencies) for qualitative variables, and means and their standard deviations for quantitative variables. An opinion from the local medical research ethics committee of the University of Parakou (CLERBUP) was taken before the start of the collection of information.

3. Results

3.1. Epidemiological Aspect

3.1.1. Prevalence

In 52 months, 75 cases of urogenital trauma were collected. During the same period, 5546 patients were seen in the surgery department. The prevalence of uro-

genital trauma at CHUD-B was estimated at 1.13% (95% CI 1.01 to 1.61).

3.1.2. Age

The average age of the patients was 31.2 ± 16 years, with extremes of 1 year and 70 years. The modal age class was [20; 40], *i.e.* 49.3% of the sample (**Figure 1**).

3.1.3. Sex

Male subjects represented 76 % (n = 57) of our sample against 24 % (n = 18) for females, *i.e.* a sex ratio of 3.2. The other sociodemographic characteristics of the patients are represented in **Table 1**.

3.2. Diagnostic Aspect

3.2.1. Topography of Lesions

Some patients had one or more lesions of the urogenital system at different levels. The **Figure 2** represents the distribution of patients according to the different

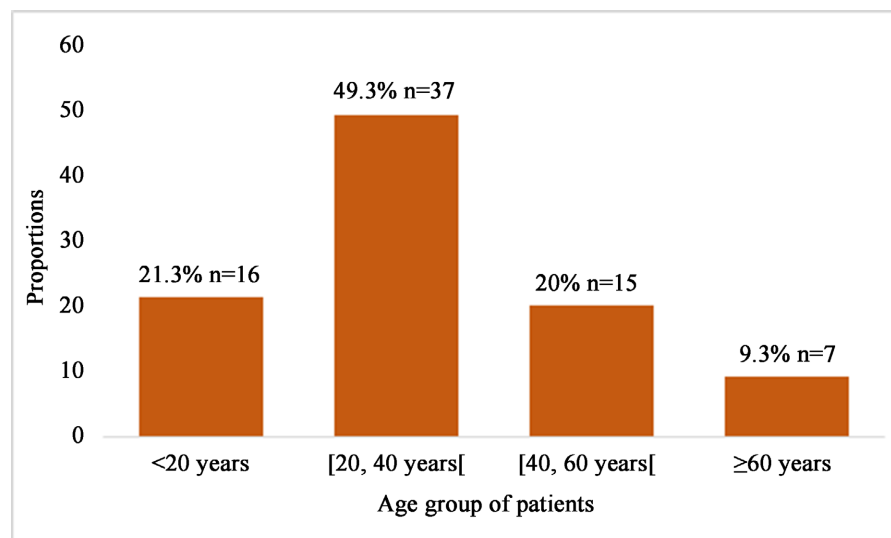


Figure 1. Distribution of patients with urogenital trauma according to age groups.

Table 1. Distribution of patients with urogenital trauma according to their sociodemographic characteristics

		No of cases	Percentage
Marital status	Married	44	58.7
	Single	30	40.0
	Divorced	1	1.3
Profession	Worker*	45	60.0
	Pupil or student	17	22.7
	Without job	9	12.0
	official	4	5.3
Address	Parakou	40	53.3
	Outside Parakou	35	46.7

*Worker = Driver, Carpenter, farmer, craftsmen, housewife.

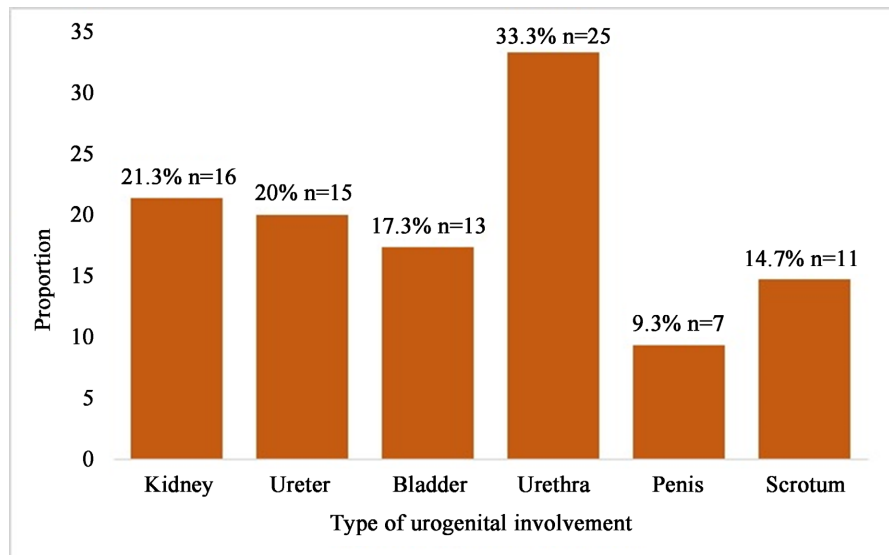


Figure 2. Distribution of patients according to the type of urogenital involvement.

damage of the urogenital system.

3.2.2. Kidney Trauma

Prevalence: the hospital prevalence of kidney trauma at CHUD-B was 0.3% in our study. In the 75 cases of urogenital trauma, the prevalence of kidney trauma was 21.3%.

Mechanism of occurrence: road traffic accidents ranked first with 62.6% followed by domestic accidents (18.7%) and falls from a height (18.7%).

Clinical signs: renal lesions were revealed by post traumatic hematuria ($n = 4$, 25.0%), lumbar pain ($n = 10$; 62.5%). The hemodynamic status was stable in nine (56.3%) patients. Seven (43.7%) others had hemorrhagic shock with low blood pressure and a small, thready pulse.

Classification: most of the patients were classified at grade I according to the AAST classification, *i.e.* 50.0% ($n = 8$) followed by grade II and IV in the same proportion 18.7% ($n = 3$) each and grade III 12.6%. The affected side was proportional, *i.e.* 50% on the right as on the left.

3.2.3. Bladder Trauma

Prevalence: the hospital prevalence of bladder trauma at CHUD-B was 0.23%. In the 75 cases of urogenital trauma, the prevalence of bladder trauma was 17.3%.

Mechanisms of occurrence: The road traffic accident represented the most occurrence with a proportion of 61.5% ($n = 8$) followed by falls from a height of 23.1% ($n = 3$). The work accident and the iatrogenic cause (digestive surgery) were found in 7.7% ($n = 1$) each one.

Clinical signs Bladder lesions were revealed by certain signs: they were macroscopic post-traumatic hematuria ($n = 3$, 23.1%), hypogastric pain ($n = 10$, 76.9%) and acute retention of urine ($n = 4$, 30.8%). The hemodynamic status was unstable in one patient. **Table 2** summarizes the various clinical findings.

Table 2. Distribution of clinical signs observed in patients with bladder trauma.

	No of cases	Percentage
Complaints		
Hypogastric pain	10	76.9
Acute retention of urine	04	30.8
Macroscopic hematuria	03	23.1
General condition		
Normal blood pressure	01	7.7
Low blood pressure	01	7.7
Tachycardia	01	7.7
Physical signs		
Vesico-cutaneous fistula	01	7.7
Hypogastric pain	10	76.9
General Defense	02	15.4
Dullness of the flanks	01	7.7

3.2.4. Urethral Trauma

Prevalence: the hospital prevalence of urethral trauma at CHUD-B was 0.44%. In the 75 cases of urogenital trauma, the prevalence of urethral trauma was 33.3%.

Clinical signs: urethral lesions were revealed by the following signs: post traumatic urethrorrhagia in all patients (n = 25), acute urinary retention (n = 17; 68.0%), perineal pain (n = 18; 72.0%), macroscopic hematuria (n = 1; 4.0%)

3.2.5. Trauma to the External Genital Organs

The prevalence was 0.31%. In the 75 cases of urogenital trauma, it was 24.0%.

3.2.6. Associated Lesions

The associated lesions were mainly splenic fracture and mesenteric contusion in 4 cases each one, *i.e.* 30.8%, and cranio-cerebral trauma in 3 cases (23.1%). There was 1 case of rib fracture and 1 case of abdominal contusion associated with thoracic contusion.

4. Discussion

4.1. Prevalence

In the present study, urogenital trauma accounted for 1.1% of admissions to the general surgery department. This rate is lower than those reported to the CNHU HKM by Ouattara *et al.* [5] and Yevi *et al.* [6], which were 7% in 2013 and 3% in 2019 respectively. The two previous studies were carried out in urology departments only treating urological lesions. This rate is low because it was calculated in the number of all patients who consulted urgently in a general surgery de-

partment taking charge of surgical conditions regardless of the specialty. Lower prevalences have been reported in the sub-region: Kambou *et al.* [7] in Burkina Faso (0.2%) and Dekou *et al.* [3] in Togo (0.2%). Today, we are witnessing an increase in cases of urogenital trauma. This is explained by the fact that we are witnessing a modernization of transport infrastructure and means of travel and also by the presence for several years of urologists in the surgery department involving a systematic search for urogenital lesions in all patients received for trauma.

4.2. Age

Young adults pay a heavy price for traffic accidents because of their professional occupations involving constant mobility. Our study corroborates this observation given the average age of the patients, which was 31.2 years. Whatever the lesion topography on the urogenital tract, road traffic accidents were the main mechanism for the occurrence of these lesions. Lower average ages were reported by Kambou *et al.* [2] and Salimi *et al.* [8] which were 27.1 years and 25 years respectively. This can be explained by the fact that young people constitute the largest and most active part of the population of developing countries; they are generally the most exposed to trauma. Other authors have mentioned that the high-risk activities carried out by men could explain the young age of the injured [9].

4.3. Sex

Most studies have reported a male predominance [10]. This is the same observation made in our series. Indeed, a male predominance was noted with a sex ratio of 3.2. Two reasons seem to justify this: at the professional level, men are more exposed than women. In addition, the anatomical configuration of the external genital organs makes men more vulnerable to those injuries [2]. The high number of urethral trauma ($n = 25$) and external genital organs ($n = 18$) in our study confirms this assertion.

4.4. Kidney Trauma

The prevalence of kidney trauma was 21.3% of urogenital trauma in our series and ranks second among urogenital trauma. According to Kambou *et al.* [2] in Burkina Faso in 2017, kidney trauma ranked first among urogenital trauma with a proportion of 26.1%. This low rate in our series can be explained by the inaccessibility to advanced diagnostic means and therefore benign lesions that go unnoticed. Hematuria or post-traumatic lumbar pains were the indications for imaging exploration in our context. However, any serious trauma patient should benefit from a general exploration including a thoraco-abdomino-pelvic computed tomography [11]. The mechanisms of onset of blunt kidney trauma are dominated by road traffic accidents [11]. In the present series, these accidents occupied the 1st place of the mechanisms of occurrence with 62.6% of the renal

traumas. These results are comparable to those of Kane [12] in Dakar who found in his series that road traffic accidents were the leading cause of kidney trauma in 54%. This can be explained by the violence of these traumas which takes into account the two mechanisms namely: the violent direct impact and the renal shock by sudden deceleration. Clinically, lumbar pain (62.5%), macroscopic hematuria (25.0%) and hemodynamic instability (43.7%) were the main clinical signs found in our study. These results corroborate the literature data. Indeed, in Morocco, the same observation was made by Mohamed *et al.* [13] who reported the same clinical manifestations, namely: lumbar pain, macroscopic hematuria and hemodynamic instability but in different proportions, *i.e.* respectively 100 %; 72% and 32%. In addition, according to Nash *et al.* [14], Rosen *et al.* [15], clinically in major renal trauma, low back pain is most often associated with macroscopic hematuria or signs of shock. This post-traumatic lumbar pain, absent in some patients in our study, can be explained by the fact that it can be masked by other painful lesions located elsewhere in contexts of polytrauma and in the circumstances of coma. The diagnostic means in our study were limited and based only on ultrasound and uroscanner in some cases. Thus, this lesion assessment based on ultrasound and uroscanner showed that most of the patients were classified as minor grades I and II (11 cases) according to the AAST classification, *i.e.* 68.7% followed by grade IV (03 cases) and grade III (02 cases). Minor kidney injuries are the most frequently encountered in African literature. This predominance does not exclude the absence of serious injuries: on the contrary, our health systems without a medical transport system do not allow the survival of serious injuries during transport from the scene of the accident to the treatment centre. These serious traumas are therefore diagnosed post mortem in our working conditions [13] [15].

4.5. Bladder Trauma

Bladder trauma accounted for 17.3% of urogenital trauma recorded in this study. These data are similar to those reported by Kambou *et al.* in Burkina Faso in 2017 [2] and by Fouelifack *et al.* in Cameroon in 2021 [7] [16] who found 13% and 13.7% of urogenital trauma respectively. In Benin, Yevi *et al.* [7] in 2018 reported that bladder trauma accounted for 13.1% of urogenital trauma. The road traffic accident was the most represented mechanism of occurrence with a proportion of 61.5% followed by falls from a height (23.1%). Motor vehicle collisions were the most common mechanism with a proportion of 45% [17].

4.6. Urethral Trauma

The prevalence of urethral trauma was 33.3% of urogenital trauma. They occupy the first place of urogenital trauma in our series. The same observation was made by Bobo *et al.* [18] in Guinea Conakry, and Owon'Abessolo *et al.* [19] in Cameroon who found that urethral trauma was the most frequent urogenital trauma also with respectively 62, 2% and 45.6%. This first place in our context

may be due to the fact that the lesions are obvious and patients are sometimes referred. The most frequent mechanism of occurrence was road traffic accidents with a proportion of 60%. The same observation was made by Bobo *et al.* [18], Owon'Abessolo *et al.* [19] and Guirrassy *et al.* [20].

4.7. Trauma of External Genital Organs

The incidence of trauma to the external genital organs is probably underestimated. The number of patients with minor lesions who are medically treated by emergency departments and general practitioners, or who do not consult, and who are therefore not included in the series of patients treated in urology departments remains unknown [18]. Trauma of external genital organs accounted for 24.0% of urogenital trauma in our series. In Senegal, Bah *et al.* [21] reported six cases in four years while Fouelifak *et al.* [16] reported a 25.4% frequency of urogenital trauma.

4.8. Associated Lesions

Abdominal and craniocerebral traumas were the lesions most often associated with urogenital trauma. These same findings were made by Perrin *et al.* who found that urogenital trauma was often associated with abdominal and pelvic trauma [22]. Similarly, Salami *et al.* in Iran [8] and Bariol *et al.* in Scotland [23] found associated lesions in 73.7% and 51% of cases respectively, demonstrating the frequency of associated lesions during urogenital trauma.

The limitations encountered were of a diagnostic nature. In view of the data in the literature, several diagnostic explorations such as cystoscopy and urography, which provide better diagnostic precision, remain unavailable in our working conditions. Similarly, in a retrospective study, some urological lesions may go unnoticed. Beyond these biases encountered, we believe that the study has good validity and could provide courses of action to improve the management of urogenital trauma

5. Conclusion

The prevalence of urogenital trauma was 1.13% of surgical admissions at CHUD /B-A. Young adults with an average age of 31.2 years were the most victimized. These traumas are the prerogative of male subjects with a predominance of 76% of patients. The urethra and external genital organs are the most affected. Road traffic accidents remain the main source of these injuries, hence the need to put in place measures to prevent these accidents.

Conflicts of Interest

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

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Aspects of Urolithiasis in Chadian Children: About of 191 Cases Collected at the Mother and Child University Hospital of N'Djamena (Chad)

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Abstract

Introduction: Urolithiasis in children is not sufficiently documented in Chad. **Objectives:** The aim of this work was to report the epidemiological, clinical and therapeutic aspects of urolithiasis in children in our environment. **Patients and methods:** This was a descriptive retrospective study of patients aged 0 - 15 years treated for urolithiasis between January 2015 and July 2020. The variables studied were age, gender, clinical, paraclinical and therapeutic aspects. **Results:** Among the 191 children, there were 164 boys (85.9%) and 19 girls (9.9%). The sex ratio was 8.63. The average age was 5.86 years with extremes (1 and 15 years). The symptomatology was dominated by dysuria. The ASP-ultrasound pair allowed the diagnosis in 183 cases (95.8%). The site of the calculus was bladder in 128 cases (67%). The average calculation size was 2.81mm. A supporting cause was found in only 1 case (posterior urethral valve). Treatment was surgical and dominated by cystolithotomy. The post-operative course was marked by 5 cases of parietal infections (2.6%) and 3 cases of vesico-cutaneous fistulas (1.6%). No case of death has been reported. **Conclusion:** Lithiasis is more common in boys in the lower urinary tract. Open surgery remains the only one practiced. Etiological research must be carried out to develop prevention strategies.

Keywords

Urolithiasis, Child, Kidney, Bladder, Chad

1. Introduction

Urolithiasis is rarer in children than in adults [1]. Its incidence and its epidemiological and etiological profile vary according to the country [1] [2] [3] [4]. Contrary to what is observed in adults where the main causes of lithiasis are nutritional, lithiasis in children is secondary to urinary tract infections, metabolic and hereditary diseases and malformations of the urinary tract [1] [5]. The discovery of lithiasis in children must always lead to a thorough etiological investigation [6]. Calculus analysis is an essential part of this investigation, which the clinician must engage in to understand the causes of calculus and define the most appropriate prophylactic measures to prevent recurrences [6]. The treatment was shock wave lithotripsy, percutaneous nephrolithotripsy, ureterorenoscopy, open surgery and medical expeller treatment [7]. The aim of this work was to report the epidemiological, clinical and therapeutic aspects of childhood urolithiasis in our environment.

2. Patients and Methods

This was a retro-prospective cross-sectional monocentric descriptive study lasting 5 years and 7 months from January 2015 to July 2020 carried out in the pediatric surgery department of the University Hospital Center for Mothers and Children in N'djamena (Chad). The data was collected from hospital registers, operating room registers and patient files. It interested all children treated for radiologically proven urolithiasis. The variables studied were age, sex, etiological factors, history, clinical and paraclinical characteristics, location, therapeutic modalities and follow-up. Included were all the children who had been operated on for urolithiasis during the study period and who had usable files. Children whose parents did not consent were not included (for the prospective part) and patients who had incomplete records. From an ethical point of view, our study protocol received clearance from the ethics committee of the University of N'djamena. We obtained the agreement of the Dean of the Faculty of Human Health Sciences of the University of N'djamena and the authorization of the Director General of the University Hospital Center for Mother and Child of N'djamena before beginning of the study, as well as the informed consent of the parents of the children for the prospective part before any inclusion in this work. Data entry and analysis were performed using SPSS 10 software. Statistical significance was set at $p < 0.05$.

3. Results

During the study period, 4436 children were admitted, of whom 191 had urolithiasis, which corresponds to an incidence of 4.30%. The average age of the children was 5.86 years with extremes of 1 to 15 years. The distribution by age groups was reported in **Table 1**. Distribution by sex: Of the 191 children, there were 172 boys (90.1%) and 19 girls (9.9%). The sex ratio was 9.05. The history was dominated by the recurrence of the lithiasis in 3 children (1.6%). The asso-

ciated urinary malformations were one case of pyelo-ureteral junction syndrome (0.5%) and three cases of posterior urethral valve (1.6%). The notion of familial lithiasis was observed in one child (0.5%). The reason for consultation was represented by **Table 2**. Plain abdominal X-ray (ASP) performed in 183 children (95.8%) showed calcium tone opacities in the bladder area (**Figure 1**). Ultrasound coupled with abdominal radiography was performed in 178 cases (93.2%). Stone locations were shown in **Table 3**. Metabolic assessment: the dosage of creatinine and urea carried out in 3 of the children presenting with nephrolithiasis was normal. Phosphocalcium balance and plasma dosage of uric acid and parathyroid hormone were not performed. Urine cytobacteriological examination (ECBU) was performed in 26 patients (13.6%). It was positive in 7 cases (3.7%). The germs isolated were *Proteus mirabilis* in 3 cases (1.6%), *Escherichia coli* in 2

Table 1. Distribution of patients according to age groups.

Age	Number (n)	Percentage (%)
0 - 11 months	0	0
1 - 4 years	84	44%
5 - 15 years	95	49.7%
Not specified	12	6.3%
Total	191	100%

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

Clinical manifestations	Number (n)	Percentage (%)
Dysuria	85	44.5%
Urinary burning	26	13.6%
Acute urinary retention	47	24.6%
Renal colic	1	0.5%
Not specified	32	16.8%
Total	191	100%

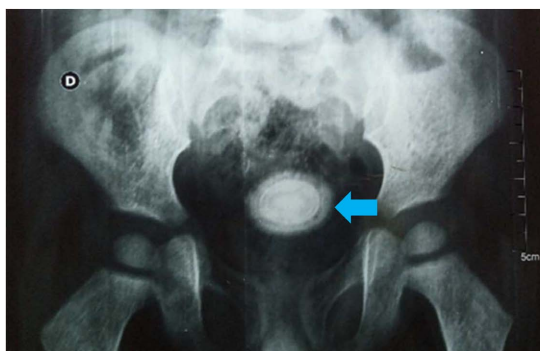


Figure 1. X-ray of the pelvis of a 3-year-old child showing a single bladder stone at the end of the arrow (source: image from the pediatric surgery department of the Mother and Child University Hospital Center of N'Djamena).

cases (1%), klebsiella and colibacillus in 1 case (0.5%) each. These pathogens were susceptible to quinolones and imipenem. The average stone size was 2.81 mm with extremes varying between 1 mm and 55 mm. We noted spontaneous elimination of stones in 3 children (1.6%). Treatment: **Table 4** shows the different types of treatment. The cystolithotomy made it possible to extract 93.2% of the stones (**Figure 2**). Physico-chemical analysis of stones was not possible. Evolution:

Table 3. Distribution of patients according to the location of stones.

Localisation	Number (n)	Percentage (%)
Kidney	8	4.2%
Ureter	1	0.5%
Urinary bladder	128	67%
Urethra	51	26.7%
Not specified	3	1.6%
Total	191	100%

Table 4. Distribution of patients according to type of treatment.

Treatment	Number (n)	Percentage (%)
Néphrolithotomy	8	4.2%
Ureterolithotomy	1	0.5%
Cystolithotomy	178	93.2%
Méatolithotomy	1	0.5%
Not specified	3	1.6%
Total	191	100%



Figure 2. Bladder stone with a long axis of 30 mm extracted (source: image from the pediatric surgery department of the Mother and Child University Hospital Center of N'Djamena).

The postoperative course was simple in 183 children (95.8%). Wall infections were reported in 5 children (2.6%). Vesicocutaneous fistulas were observed in 3 cases (1.6%). No death cases were recorded. No case of recurrence has been reported.

4. Discussion

The limitations of our study are related to its monocentric nature, as well as its relatively small duration and sample. This obliges us to remain modest for the generalization of our results. However, the prospective collection of data is strength, most other African studies on the subject being retrospective. Epidemiology: The incidence of urinary stones in children is variously assessed by the authors [3]. In our series, urolithiasis represents 4.30% of all pathologies recorded during the study period. As noted in our series, urolithiasis in children affects boys more often than girls with a sex ratio of 8.63. In Mauritania Sow [3] reported a ratio of 19:1. The other authors have reported a sex ratio varying between 1.3 and 3.5 [1] [2] [4] [6]. This observation can be explained anatomically by the resistance to urine flow which is higher in boys because of the greater length [6] and the tortuosity [8] of the urethra, whereas the brevity and largesse of the urethra in girls can easily pass a small stone [4]. The predominance of the male sex does not seem to be influenced by the delay in circumcision [4]. The average age of our children of 5.86 years is superimposed on that of the literature which varies between 5.4 years and 7.86 years according to the authors [2] [3] [5] [9]. Clinically, the symptomatology depends on the location of the stone [3]. In the upper urinary tract, the most common manifestations are pain, urinary tract infection and hematuria [3]. Localization in the lower tract can be revealed by dysuria or even urinary retention [3]. acute urinary retention is due to spasm of the bladder sphincter, the stone becoming embedded in the bladder neck or its migration into the urethra [4]. Diagnosis is based primarily on the radio-echography pair, which provides information on the number, location, size of stones and whether or not there is dilatation upstream [3] [10]. In our series, the radiological examinations made it possible to visualize single stones in 183 children (95.8%) of the patients, double stones in 3 children (1.6%) and triple stones in 1 child (0.5%). A single stone was found in 99% of patients [9], while Alaya [6] reported multiple stones (1 to 25) in 62.5% of cases. According to Shah *et al.* [11], a urethral calculus in children is rare and its association with the posterior urethral valve is even rarer with a few cases reported worldwide. Associated urinary malformations were found in 6 cases: 2 posterior urethral valves, 1 pyelo-ureteral junction syndrome, one mega-ureter, one pyelic bifidity and one ureteral bifidity [4]. On the imaging level, the association ASP-ultrasound has a sensitivity of 90% and a specificity between 75-100% in the diagnosis of urolithiasis [10]. The phosphocalcic balance and the plasma dosage of uric acid and parathyroid hormone were not carried out taking into account the purchasing power of the patients.

Biologically, the results of the cytobacteriological examination of urine (ECBU) are consistent with those of other authors. The most isolated germs were *Escherichia coli*, *Proteus mirabilis* and *Staphylococcus aureus* [2] [4] [6] [9]. These germs were isolated in proportions varying between 14.48% and 26.2% [2] [4] [6] [9]. This low positivity rate can be explained by laboratory difficulties because 39% of ECBU are sterile despite the clinical signs of urinary tract infections [4] and by self-medication with street drugs in our context. The bladder localization mainly found in our series corroborates the findings of authors from the south of the Sahara [3] [9] [12] unlike some other North Africans [1] [2] [6] [10] [13] who reported a predominant localization at the level of the upper Urinary System. Etiological research is essential to avoid recurrences and deterioration of renal function, especially in the case of metabolic causes [3]. In children, several lithogenic factors have been cited: infections, urinary malformations, metabolic and genetic abnormalities, recurrent episodes of diarrhea and/or dehydration [1] [3] [5]. Struvite remains the best marker of lithogenic infections [4]. Due to the absence of a specialized urolithiasis laboratory, the chemical examination of stones was not performed as reported by Tfeil *et al.* [4]. According to the literature, the morpho-constitutional analysis reveals that calcium oxalate monohydrate is the major component of lithiasis in the order of 47 to 85% according to the authors [1] [6] [12] [13] [14]. The maximum size of 55 mm observed in our series is greater than that of the authors between 1 and 40 mm [2] [7] [14]. The frequency of stones expelled spontaneously is low in children, unlike what is observed in adults [1]. Our rate of 1.6% in 3 children is close to the 4% reported by El Lekhlifi [2] and clearly lower than the 25% established by Marrakchi [1]. TREATMENT: Unlike developed countries where conventional surgery is supplanted by minimally invasive surgical techniques, our study has shown that open surgery remains the only practiced in our environment in the absence of the technical platform. Our results are consistent with those of Tfeil (4) in Mauritania, Alaya [6] in Tunisia and Ali in Chad [4] [6] [9] who reported a cystolithotomy rate of 99% to 100%. Extracorporeal lithotripsy is indicated for small upper urinary tract stones [4] [7]. A balanced diet and plenty of fluids are recommended to prevent stone recurrence [12]. The physico-chemical analysis of calculus could not be done because of the insufficiency of the technical platform. Evolution: the postoperative course was simple in 183 children (95.8%) superimposable on the 97% reported by [4]. Wall infections were reported in 5 children (2.6%), comparable to the 2 and 3 cases cited by the authors [3] [4] [9]. They evolved favorably under antibiotic treatment. The vesicocutaneous fistula was noted in 3 cases (1.6%) against 2 cases (1.5%) reported by Ali [9] in relation to the size of stones. In our study, we observed that fistulas were related not only to stone size but also to the general condition of the patient. None of our patients was seen again in the long term. The loss of sight suggests a good evolution [4]. The relative rarity of recurrence in children is recognized by most authors [4]. El Lekhlifi [2] reported a recidivism rate of 12% while in Mexico

velázquez-Forero [5] observed a rate of 16% - 67%. In our series, no case of death was noted against 1 case of death reported by Sow [3].

5. Conclusion

Lithiasis is more common in boys aged 2 to 8 and is often found in the lower urinary tract. Diagnosis is easy and confirmed by radio-echography. Treatment depends on the location and size of the stones. Open-air surgery remains the only practice in our environment. Etiological research should be conducted to develop prevention strategies.

Conflicts of Interest

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

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Sexual Functional Prognosis of Penile Emergencies at the University Hospital of Libreville

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Abstract

Introduction: Penile emergencies are multiple and varied, and they can jeopardize the sexual functional prognosis of the patient. The objective of our study was to evaluate the sexual functional prognosis of patients admitted for penile emergencies. **Patients and Methods:** We conducted a cross-sectional study from January 1 to 31, 2021, in the urology department of the University Hospital. Variables included sociodemographic, diagnostic, and evolutionary data of sexually active patients admitted for a penile emergency. **Results:** During this period, 68 patients were admitted for penile emergencies. We included 45 sexually active patients, with a mean age ranging from 34.5 ± 14.1 years with extremes of 16 and 90 years. The most frequent penile emergencies were priapism (62.2%) and penile fracture (22.2%), with a mean time for treatment of 21.4 ± 52.5 hours. The sexual functional prognosis was very satisfactory (normal erection) in 71.1% ($n = 32$) of patients. Loss of erectile function was observed in 4.4% ($n = 2$) of cases. **Conclusion:** Penile emergencies are relatively frequent, dominated by priapism and penile fracture in our context. The sexual functional prognosis is good.

Keywords

Penile Emergency, Diagnosis, Sexual Functional Prognosis, Libreville

1. Introduction

Penile emergencies are a group of pathologies, traumatic or not, which affect the penis and require immediate and early treatment within the first 6 hours [1].

They are due to pathologies caused by various anomalies of the erectile hemodynamics, among the most frequent we can mention, priapism, penis fracture, and penis self-mutilation [1]. These are uroandrological emergencies. Their etiologies are multiple and varied, ranging from coitus failure in the case of penile fracture to sickle cell disease in the case of priapism [2].

Their occurrence is exceptionally life-threatening, but the functional prognosis can be disastrous, even leading to the loss of erection, and can be responsible for social drama.

In Western countries, penile emergencies occur mainly during sexual intercourse [3] [4] [5] [6]. In Africa, data on penile emergencies are not widely available, and they are probably underestimated in terms of frequency, but traumatic penile emergencies and priapism are the most frequently reported [1] [7] [8] [9].

Some data exist for some of these penile emergencies but not their possible impact on sexuality. The purpose of our study is to report the functional prognosis of patients treated for all penile emergencies at the University Hospital.

2. Patients and Methods

This was a cross-sectional, descriptive, single-center analytical study conducted from January 1 to 31, 2021, in the urology department of the UHC of Libreville. We interviewed patients treated for penile emergencies since the reopening of the urology service in 2016 about the quality of their sexual health. Patients aged 15 years or older hospitalized for penile emergencies were included regardless of the treatment administered. Patients younger than 15 years at the study time were omitted. Exclusion criteria were lack of sexual activity during the previous 6 months and refusal to sign the informed consent document.

The variables studied were sociodemographic (age, occupation, marital status, and residence). Age was grouped into 4 15-year age groups: [15 - 29], [30 - 44], [45 - 64], ≥ 65 years. Diagnostic parameters studied were history, time to urology consultation, and retained diagnosis. Therapeutic parameters included time to and type of treatment.

We studied the immediate outcome, the post-treatment evolution, and the IIEF5 score in evolution and prognosis. Urology consultation time was between the onset of symptoms and the consultation with a urologist at UHC. Time to urology treatment was the time from hospitalization to medical or surgical treatment of the patient. We defined peripheral treatment as any drug or non-drug means administered to the patient outside the urology department. We then looked for an association between these parameters and the quality of sexual function.

For the evaluation of erectile function, each patient was asked to complete a telephone survey based on the contact information provided in the records. The International Index of Erectile Function score (IIEF5) was used to evaluate erectile quality objectively. This score is a simplified version of the IIEF₅. It is a self-administered survey with 15 items in 5 different domains, including erectile function, sexual satisfaction, orgasmic function, sexual desire, and overall satis-

faction. Answers are rated from 0 to 5 per question. It allows the detection and objectification of the level of erectile dysfunction. Its rating is as follows:

- 6 - 10: severe erectile dysfunction;
- 11 - 16: moderate erectile dysfunction;
- 17 - 21: mild to moderate erectile dysfunction;
- 22 - 25: mild erectile dysfunction;
- 26 - 30: no erectile dysfunction.

Data were collected using a standardized collection form. Data entry and analysis were performed using EPI info version 7.2.4.0 and Excel version 2013. We looked for an association between the type of penile emergency, the consultation time, the treatment time, and the sexual functional prognosis of the patients. The proportions were compared using the Pearson chi-squared test with a significance level of 5%.

On ethical and regulatory aspects, only patients who had signed an informed consent document (that of the legal representative if the patient was under 18 years of age) were included in the study, and we also obtained authorization from the general treatment of the UHC and the urology department to conduct this study. However, the data collection forms were kept secure within the department, and only team members who had signed a confidentiality agreement had access to the data.

3. Results

We recorded 68 patients admitted for penile emergencies (PE) out of 1938 hospitalized in the urology department during the study period. We included 45 of them, and the prevalence of penile emergencies was 3.5%. About your comment about patient volume in one month, it was more of a cross-sectional analysis during one month of patients previously managed over a 5 year period from 2016 to 2020 in our department.

The mean age of the patients was 34.5 ± 14.1 years, with extremes of 16 and 90 years. Grouping by age showed a peak in frequency in the [15 - 29] age group with 44.4% of patients ($n = 20$). 18 patients (40%) were between 30 and 44 years of age; 5 (11.1%) were between 45 and 64 years of age, and only 2 patients (4.4%) were at least 65 years of age.

Sickle cell disease and priapism were the most common antecedents with 28.9% ($n = 13$) and 22.2% ($n = 10$) of cases. 7 were homozygous sickle cell (SS) and 03 heterozygous (AS) regarding sickle cell patients.

Our sample's most represented penile emergency was priapism with 62.2%, followed by a penile fracture with 22.2% of cases.

All these diagnostic aspects are presented below in **Table 1**.

Painful erection was the reason for consultation in 66.7% of cases ($n = 30$), followed by post-traumatic swelling of the penis with 28.9% of cases ($n = 13$). Penile bites represented 4.4% of cases ($n = 2$). The average delay for consultation in urology was 1.3 ± 2.3 days with extremes of 30 min and 3 months. 16 patients

Table 1. Distribution of patients treated for penile emergencies from 2016 to 2020 at UHC.

History	Number	(%)
Priapism	13	28.9
Sickle cell disease	10	22.2
EGO trauma	2	4.4
Diabetes	4	8.9
Aphrodisiac use	2	4.4
Psychiatric disorder	2	4.4
Taking anti-inflammatory medications	1	2.2
Stenosis of the urethra	1	2.2
None	10	22.2
Diagnosis		
Non-traumatic penile emergencies	29	64.4
Priapism	28	62.2
Penile thrombosis	1	2.2
Traumatic penile emergencies	16	34.4
Penile fracture	10	22.2
Penile wound	2	4.4
Ischemic gangrene of the glans	1	2.2
Penile phlegmon	1	2.2
Intra urethral foreign body	1	2.2
Partial amputation of the penis	1	2.2

*EGO = External Genital Organs.

(35.6% of the cases) had consulted between 0 and 6 hours, 6 patients (13.3%) between 6 and 12 hours, 5 (11.1%) between 12 and 24 hours, and 11 cases (24.4%) after 24 hours. This delay was not specified in 7 patients (15.6%).

The mean age of patients treated specifically for priapism was 35.2 ± 17 years. A history of priapism was found in 13 (46.4%) patients followed by sickle cell disease in 09 (32.1%) patients. Twenty-three (23) patients (82.1%) had a normal erection, 3 (10.7) patients had a mild erectile dysfunction and one (3.6%) patient had a total loss of erectile function. The age, history, reason for consultation and results of the treatment are listed in **Table 2**.

In our series, penile fracture accounted for 22.2% ($n = 10$) of patients treated for penile emergencies. The mean age of these patients was 34.7 ± 5.5 years with extremes of 29 and 42 years. The age range [30 - 44 years] represented 8 patients or 80% of cases (**Table 3**). All patients had undergone surgical management, which consisted of albuginorrhaphy in 9 cases (90%). A cavernoplasty was performed in

Table 2. Summary of patients managed for priapism at UHC from 2016 to 2020.

Settings	Number (n)	(%)
Age (ans)		
15 - 29	15	53.6
30 - 44	6	21.4
45 - 64	5	17.9
65 et +	2	7.1
History		
Trauma of the bursa	1	3.6
Priapism	13	46.4
Sickle cell disease	9	32.1
Aphrodisiac	2	7.2
Diabetes	3	60.7
Time of consultation		
0 - 6	8	28.6
6 - 12	3	10.7
12 - 24	4	14.3
>24	9	32.1
Unknown	12	42.9
Time of treatment		
0 - 6	11	39.3
6 - 12	0	0
12 - 24	1	3.6
>24	4	14.3
Unknown	12	42.9
Treatment		
Medical and instrumental	20	71.4
Médical and surgical	8	28.6
Résultats after treatment		
Detumescence	28	100

one patient who consulted 3 months after the trauma. Erection inhibition with cyproterone acetate was systematically associated for one month.

The average time for care in urology was 2 hours, and it varied from immediate care to 10 days. Twenty (20) patients or 44.4% of cases were treated between 0 and 6 hours. This time was not specified in 37.8% of cases (**Table 4**).

Peripheral care ranged from no treatment in 60% of patients (n = 27) to analgesic administration in 22.2% (n = 10) of cases. Puncture of the corpora cavernosa

Table 3. Summary of patients managed for penile fracture at UHC from 2016 to 2020.

Parameters	Number (n)	(%)
Age (ans)		
15 - 29	2	20,0
30 - 44	8	80,0
45 - 64	0	0,0
65 et +	0	0,0
History		
Sickle cell disease AS	1	10,0
Nothing	9	90,0
Reason for consultation		
Post traumatic swelling of the penis	9	90,0
Painful erection	1	10,0
Treatment		
Surgical	1	10,0
Medical and surgical	9	90,0
Results		
Détumescence	9	90,0
Not precised	1	10,0
Time of consultation (H)		
0 - 6	4	40
6 - 12	2	20
12 - 24	1	10
>24	2	20
Unknown	1	10
Time of treatment (H)		
0 - 6	5	50
6 - 12	2	20
12 - 24	0	0
>24	0	0
Unknown	3	30

was performed in 3 patients (6.7%), and the use of small means (sexual intercourse and cold) was reported in 8.8% (n = 4) of patients.

Puncture of the corpora cavernosa was performed in 19 patients, *i.e.*, 42.2% of cases. It was associated with intracavernous injection of diluted adrenaline in 4 patients. All patients had received medical treatment to inhibit postoperative

erections (20% of cases) or hyperhydration in sickle cell patients (20% of cases). One patient treated for penile thrombosis was put on an anticoagulant. Surgically, albuginorrhaphy and cavernous-spongy shunt were performed in 9 (20.0%) and 8 (17.8%) of the patients, respectively.

The sexual functional prognosis was satisfactory in 80% of the patients with an IIEF₅ score of 26 to 30. 4 patients (8.8%) had lost their erectile function (Figure 1).

There was no association between type of penile emergency and sexual functional prognosis ($p = 0.102$). Patients hospitalized for penile fracture and priapism had regained normal erectile function in 90% and 82.1% of cases, respectively. 4 patients treated for ischemic gangrene of the penis, total amputation of the penis, priapism, and intraurethral foreign body had a complete loss of erectile function. The comparison between the type of penile emergency and the functional prognosis is summarized in Table 4.

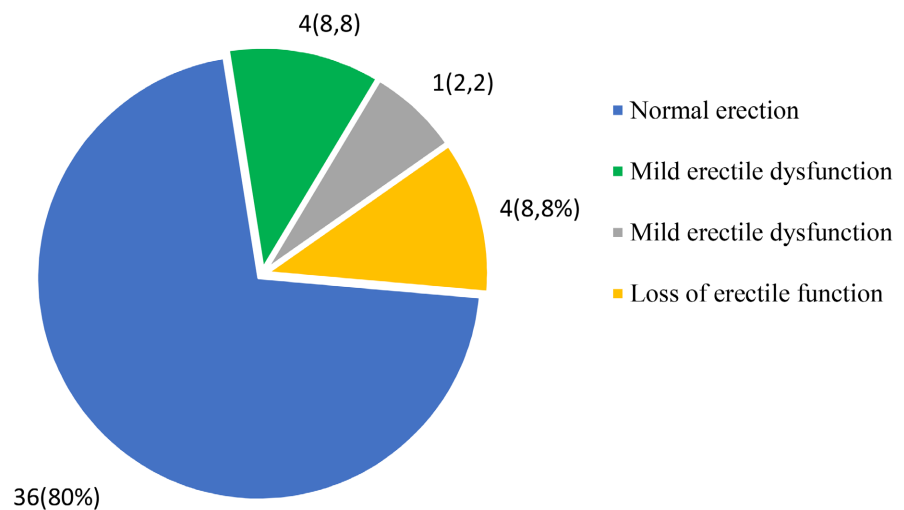


Figure 1. Distribution of patients treated for penile emergencies from 2016 to 2020 at UHC according to sexual functional prognosis.

Table 4. Sexual functional prognosis and type of penile emergency of patients at UHC.

Penile Emergencies	Normal Erection n (%)	Mild Disorder n (%)	Moderate Disorder n (%)	Loss of EF n (%)	Total	P
Priapism	23 (82.1)	3 (10.7)	1 (3.6)	1 (3.6)	28 (100.0)	0.482
Penile fracture	9 (90.0)	1 (10.0)	0 (0.0)	0 (0.0)	10 (100.0)	0.848
Penile wound	2 (100.0)	0 (0.0)	0 (0.0)	0 (0.0)	2 (100.0)	1.000
Partial amputation of the penis	0 (0.0)	0 (0.0)	0 (0.0)	1 (100.0)	1 (100.0)	1.000
Intra urethral foreign body	0 (0.0)	0 (0.0)	0 (0.0)	1 (100.0)	1 (100.0)	1.000
Ischemic gangrene of the penis	0 (0.0)	0 (0.0)	0 (0.0)	1 (100.0)	1 (100.0)	1.000
Penile phlegmon	1 (100.0)	0 (0.0)	0 (0.0)	0 (0.0)	1 (100.0)	1.000
Penile thrombosis	1 (100.0)	0 (0.0)	0 (0.0)	0 (0.0)	1 (100.0)	1.000

There was no association between the functional prognosis and the time of consultation ($p = 0.319$). Between 0 and 6 hours, 15 patients or 93.8% of the cases had recovered a normal erection. Among those who consulted after 24 hours, 7 patients (63.6%) also regained a normal erection (**Table 5**).

Comparison of the time to treatment and sexual functional prognosis showed no association ($p = 0.932$). Of the 20 patients treated between 0 and 6 hours, 2 (10%) had lost their erectile function, and of those treated beyond 24 hours, 75% had maintained a normal erection (**Table 6**).

4. Discussion

The mean age of the patients in this study was 34.5 ± 14.1 years, and this means that the patients were young, with the 15 - 29 age group accounting for almost half of the total number. This result is similar to that of Kouame *et al.* [1], in whom the 15 - 25 age group is the most affected, with 36.5% of cases. This average age is higher than that reported by Diabaté *et al.* [7], 21.9 ± 18.5 years in their series on amputations and other penile trauma in Senegal. On the other hand, our patients are relatively younger than Niang *et al.* [9] in Senegal and those of Barry *et al.* [10] in Guinea Conakry, who report an average of 36 and 37 years in comparison to their series on penis fracture. Despite some differences in the authors mentioned above, most cases were in young adults, and this could be explained by the fact that this is the age of intense sexual activity, often using aphrodisiacs.

Priapism and penis fracture were the most common diagnoses in our study, with 62.2% and 22.2% of patients, respectively. This result was identical to that found in Côte d'Ivoire in Kouamé *et al.* [1]. In Diabaté *et al.* [7], penile fracture

Table 5. Sexual functional prognosis and consultation time for penile emergencies at UHC.

Time to consultation (H)	Normal erection	Mild Disorder	Moderate Disorder	Loss of EF	Total	P
0 - 6	15 (93.8)	0 (0.0)	0 (0.0)	1 (6.3)	16 (100.0)	0.212
6 - 12	4 (66.7)	1 (16.7)	0 (0.0)	1 (16.7)	6 (100.0)	1.000
12 - 24	4 (80.0)	1 (20.0)	0 (0.0)	0 (0.0)	5 (100.0)	1.000
+24	7 (63.6)	2 (18.2)	1 (9.1)	1 (9.1)	11 (100.0)	0.243

Table 6. Sexual functional prognosis and time to treat penile emergencies at UHC.

Time to treatment (H)	Normal erection	Mild Disorder	Moderate Disorder	Loss of EF	Total	P
0 - 6	15 (75.0)	2 (10.0)	1 (5.0)	2 (10.0)	20 (100.0)	0.711
6 - 12	2 (100.0)	0 (0.0)	0 (0.0)	0 (0.0)	2 (100.0)	1.000
12 - 24	1 (50.0)	1 (50.0)	0 (0.0)	0 (0.0)	2 (100.0)	1.000
+24	3 (75.0)	1 (25.0)	0 (0.0)	0 (0.0)	4 (100.0)	1.000

represented only 13.3% of the patients, while penile wounds and amputations were more frequent with 73.3% of the cases.

The comparison between the different types of penile emergencies and the sexual functional prognosis of our patients did not find a significant difference ($p = 0.102$). Patients treated for penile fracture had a better prognosis (90% of cases of normal erection) than those treated for priapism (82.1% of cases of normal erection). Also, despite the rarity of the cases, intraurethral foreign body, amputation, and ischemic gangrene of the penis had a poor prognosis; Ischemic gangrene in the series by Moutawakkil *et al.* [11] also had a poor prognosis.

We did not find any association between the consultation time and the sexual function prognosis ($p = 0.319$). Of the patients seen between 0 and 6 hours, 93.8% of the cases had recovered a normal erection. Among those seen after 24 hours, only 63.6% had recovered a normal erection. Despite the absence of an obvious association, patients seen earlier had a better prognosis. This lack of association may be due to the small size of our sample.

Moreover, Kouamé *et al.* [1] state that their failure rate of 28.9% among patients treated for priapism was related to the delay in consultation. Slimen *et al.* [2] reported that 38.1% of patients with significant erectile dysfunction despite a preserved libido had the most prolonged delay in consultation, ranging from 3 to 10 days (average 6.6 days). For Falandry *et al.* [12], whatever the etiology, the severity of the sequelae depends essentially on the time factor, even if this is not the only parameter. Although some priapism, especially in sickle cell disease, may persist for a few days without leaving any sequelae due to chronic hypoxia or incomplete blockage of cavernous drainage, all the authors agree that the sequelae are more severe than those of the other patients. All authors agree on the harmfulness of the time elapsed because it allows the installation of a vicious circle aggravating anoxia and histological suffering, which progressively gives way to tissue necrosis responsible after the 48th hour, for a significant sequelae fibrosis and a risk of definitive impotence of about 60%. The rate of impotence is greater than 80% after the fourth day.

The difference between treatment time and the sexual functional prognosis was also insignificant ($p = 0.932$). Among the 20 patients treated between 0 and 6 hours, 2 (10%) had lost their erectile function, and among those treated beyond 24 hours, 75% had maintained a normal erection. This lack of association must be qualified by the type of penile emergency treated during these different time slots because several authors incriminate the length of this delay. Slimen *et al.* [2] find that the time taken to attend seems to be the most important factor. The longer the delay, the higher the risk of permanent sexual dysfunction, since 66.7% of their patients treated within the first 72 hours recovered a normal erection, whereas only 25% of patients treated after this delay had a favorable evolution. Bouya *et al.* [8] report that all ten patients with absent or insufficient erection were treated after the 30th hour and that among the five patients treated with intracavernous injection of etilefrine, all three successes were observed in patients seen before the 24th hour. Kamel *et al.* [13] consider that the

risk of secondary erectile dysfunction depends on several factors: the delay in treatment. In their series, only two had a favorable outcome among the ten patients treated beyond the third day (28% of cases). For the 12 patients treated between the 12th and 72nd hour, 6 (50%) maintained regular sexual activity, while the others became impotent. For Ouattara *et al.* [14], adequate diagnosis and prompt treatment of the penile fracture are necessary to prevent the development of organic and functional complications. However, all these studies have small numbers. Therefore, it is not easy to substantiate their claims because the statistical tests we performed may not confirm them.

The sexual functional prognosis was satisfactory in 80% of the patients in this study. 4 patients (8.8%), including one admitted for priapism, had completely lost their erection. Only one patient had a mild erectile dysfunction after a penile fracture. These results are similar to Kouamé *et al.* [1], with 80% of patients maintaining a normal erection and good sexual function. Bouya *et al.* [8] in Congo Brazzaville, Habou *et al.* [15] in Niger, and Kassogué *et al.* [11] in Mali found a lower result with respectively 50%, 58.3%, and 31% of patients having a normal erectile function. Falandry *et al.* [12] report more alarming results with 56.8% of a total loss of erectile function. Our rather satisfactory results could be attributed to the age of our patients, the short consultation time, and the rapidity of the treatment.

The limitations of the study are first of all related to the small sample size that does not allow for definite correlations. It was also difficult for diabetic patients to differentiate between erectile dysfunction related to the occurrence of penile urgency and their comorbidity.

5. Conclusion

Penile emergencies are manifold but dominated by penile fracture and priapism. They occur in young adults with a history of priapism and sickle cell disease. The diagnosis of these emergencies is clinical. The type of penile emergency, consultation, and treatment delays are not associated with the sexual functional prognosis, which is globally satisfactory in our context.

Conflicts of Interest

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

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Question 1

Questionnaire for the study of the sexual functional prognosis of penile emergencies managed at the urology department of the University Hospital of Libreville from January 1, 2016 to December 31, 2020.

Identity of the patient

Date of collection:

Date of birth:_____Age:_____

File number:_____

Phone number:_____

Occupation:_____

Marital status: married ☐ cohabiting ☐ single ☐

History/conditions prior to the penile emergency:

Sickle cell disease: yes ☐ no ☐

Circumcision: Location ☐ practicing ☐

Traumatisme:

Previous episode of spontaneously resolving painful erection:

Previous episode of priapism: yes ☐ no ☐

Other:

Clinic at time of penile emergency

Peripheral management:_____

Time to urology consultation:_____

Reason for consultation:_____

Painful erection without sexual stimulation ☐

Painful erection after sexual stimulation ☐

Swelling of the penis ☐ Penile trauma ☐ Other ☐

Diagnosis:_____

Priapism ☐ Fracture of the penis ☐ Mutilation of the penis ☐

Other ☐

Treatment received

Time and nature of management of penile emergency in periphery:_____

Time to consultation of penile emergency in urology:_____

Time to management of penile emergency in urology:_____

Nature of management in urology:_____

Medical ☐ Puncture/Wash ☐ Surgery ☐

Immediate outcome:_____

Course/Follow-up:_____

Date of last sexual intercourse:_____

IIFE5 Score Result:_____

Are There Prognostic Factors for Failure of Surgical Treatment of Post-Traumatic Posterior Ureteral Stenosis? About 30 Cases and Review of the Literature

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Abstract

Introduction: The management of post-traumatic stenosis of the posterior urethra is divided between early endoscopic realignment and delayed surgery. In the latter case, several techniques are used taking into account several factors. Our objective was therefore to investigate the possible prognostic factors of failure of this surgical management. **Material and Methods:** We conducted a retrospective study from January 2006 to December 2017 on patients admitted to the Urology Department of the Mohammed 6 University Hospital of Marrakech for management of post-traumatic posterior urethral stenosis. The parameters studied were age, medical and surgical history, causes, characteristics of the stenosis (location, number, length), associated lesions, surgical technique used, and evolution. The descriptive analysis consisted of calculation of absolute and relative frequencies for the qualitative variables, and of position and dispersion parameters for the quantitative variables (mean, standard deviation). In bivariate analysis, the comparison of categorical variables used Pearson's Chi-square statistical test and Fisher's test if necessary. The significance threshold was set at $p < 0.05$. **Results:** A total of 30 cases were selected. The age of our patients varied between 18 and 68 years, with an average of 38.33 years (16 - 80 years); the most affected age group was between 20 and 39 years. The mode of revelation of urethral damage was dominated by acute retention of urine present in 76% of patients, followed by dysuria (33%). The stenosis extended over 21.91 mm on average (14 - 40 mm). It was accompanied by bone involvement in 15 patients (53.3%). Erec-

tile dysfunction was present in 23 patients (23%). Terminal urethrogram was the main surgical technique used, followed by internal urethrotomy (60% and 30% respectively). 15 patients had a recurrence, with an average of 1-second operation. Statistical analysis of the different factors studied showed no correlation with the occurrence of recurrence after surgical treatment. **Conclusion:** The medium and long term results of anastomotic repair of the posterior urethra do not seem to depend on the lesion parameters of the stenosis (site, number, extent, presence of associated bony lesions or erectile disorders).

Keywords

Posterior Urethra, Stenosis, Urethrogram, Endoscopic Realignment

1. Introduction

Urethral stricture is defined as abnormal scarring that restricts the urethral lumen. It will manifest itself clinically by obstructive urinary symptoms such as dysuria, a decrease in micturition flow, or in the extreme by acute retention of urine. It is a frequent cause of hospitalization in urology [1]. If left untreated, the obstruction constituted by the stenosis will have an impact on the bladder (pressure bladder), and then on the upper tract (ureterohydronephrosis), ultimately leading to renal failure. The causes may be infectious (recurrent urethritis, urogenital tuberculosis, urinary bilharzia), iatrogenic (endoscopic instrumental maneuvers) and traumatic causes represent between 9% and 25% of the etiologies [1]. The management of post-traumatic stenosis of the posterior urethra in particular is divided between early endoscopic realignment within 10 to 15 days after the trauma, and delayed surgery after 3 months [2] [3]. In the latter case, several surgical techniques are proposed (internal urethrotomy, terminal urethrorrhaphy, urethroplasty) taking into account factors such as the location, number, size of the stenosis, and the patient's history. In spite of the numerous existing operative techniques, the number of recurrences of this condition remains important [4]. Our objective was therefore to search for possible prognostic factors of failure of their surgical management.

2. Material and Methods

We conducted a retrospective study from January 2006 to December 2017 on patients admitted to the urology department of the Mohammed 6 University Hospital of Marrakech for management of post-traumatic posterior urethral stenosis. We excluded all patients with stenosis of inflammatory or iatrogenic origin, and stenosis of the anterior urethra. A total of 30 patients were included in our study. Data entry was done on Microsoft Office 2016 software. For the elaboration of this work, we based on the patients' records. With the help of an exploitation form, we explored the following parameters: age, medical-surgical history, causes, characteristics of the stenosis (site, number, length), associated

lesions, surgical technique used, evolution. The surgical techniques used were internal urethrotomy by endoscopic approach, terminal urethrorrhaphy by perineal approach, urethroplasty with graft of the buccal mucosa. Pre and post-operative analyses of the quality of micturition are evaluated by debimetry, and the post-micturition residue. The success of the operation was defined by: the absence of recourse to another urethral surgery or to dilatation maneuvers, the obtaining of a normal micturition, with a follow-up of at least 6 months. A micturition was considered normal if it obtained the following criteria: no dysuria, debimetry ≥ 15 ml/sec without post-void residual, no appearance of stenosis on urethrography or cystoscopy. A failure was defined by, an intervention that could not result in satisfactory micturition, recourse to another urethral surgery or dilatation maneuvers. The descriptive analysis consisted of the calculation of absolute and relative frequencies for the qualitative variables, and of the position and dispersion parameters for the quantitative variables (mean, standard deviation). The normal distribution of the variables was studied by the Kolmogorov-Smirnov test. In bivariate analysis, the comparison of qualitative variables used Pearson's Chi-square test and Fisher's test if necessary. The Student t test and the Mann Whitney test were used to compare continuous variables. The significance level was set at $p < 0.05$. Statistical analysis was performed using SPSS version 19.0 software.

3. Results

A total of 30 patients were included in our study. The age of our patients ranged from 18 to 68 years, with an average of 38.33 years (16 - 80 years); the most affected age group was between 20 and 39 years [Figure 1]. The main causes were public road accidents (PVA) 56.7%, followed by work-related accidents (WIA) 20% [Figure 2].

The mode of revelation of urethral damage was dominated by acute retention of urine present in 76.6% of patients, followed by dysuria (50%) [Table 1]. The

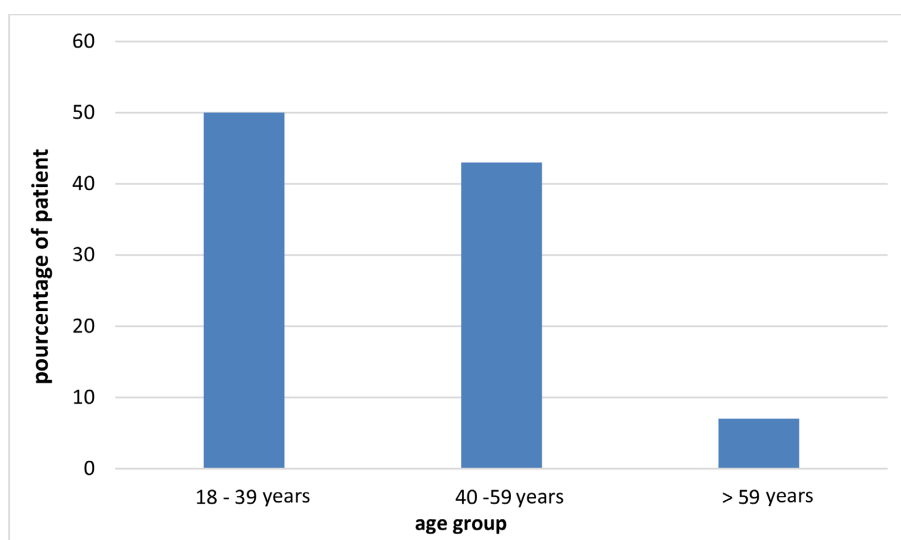


Figure 1. Distribution of posterior urethral stenosis by age group.

stenosis extended over an average of 21.91 mm (14 - 40 mm). It was accompanied by bone involvement in 15 patients (50%). Erectile dysfunction was present in 8 patients (26.6%). All patients underwent surgery at least 3 months after the trauma.

Terminal urethrogram was the main surgical technique used, followed by internal urethrotomy (60% and 30% respectively) [Figure 3]. 19 patients (63.3%) had an immediate failure at the first operation, requiring a second surgery in 5 of them, 2 repeats in 8 cases, 3 repeats in 3 cases, 4 repeats in 2 cases and 5 repeats in 1 patient. The statistical analysis of the different factors studied, which were the characteristics of the stenosis (site, number, length), the associated lesions (bone fracture), the presence of erectile dysfunction, the surgical technique used; The analysis made by Pearson's Chi-square test and Fisher's exact test showed that the dependence was not significant ($\chi^2 = 0.665$; $ddl = 5$; $1-p = 94\%$) [Tables 2-4], therefore, that no correlation exists between the above-mentioned factors and the occurrence of recurrences after surgical treatment.

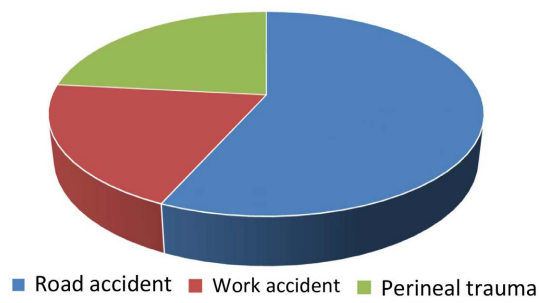


Figure 2. Stenosis etiology.

Table 1. The most common functional signs found in patients.

Functional signs	Number	Pourcentage %
Dysuria	15	50
Acute urine retention	23	76,6
Fistula	1	3,3
Uretrorrhagia	7	23,3

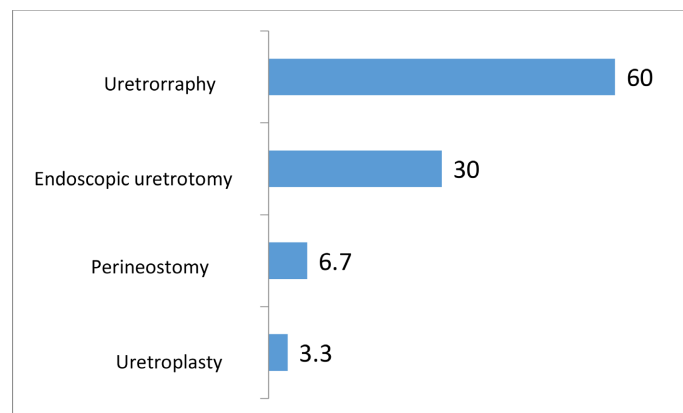


Figure 3. Surgical procedure.

Table 2. Study of age factor.

cross-tabulation age * recurrence						
			Recurrence		Total	
			non	oui		
Age	15 - 49 years	Number	10	14	24	
		% of Age	41.7%	58.3%	100.0%	
	50 years and more	Number	1	5	6	
		% of Age	16.7%	83.3%	100.0%	
	Total	Number	11	19	30	
		% of age	36.7%	63.3%	100.0%	
Khi-deux test						
		Value	ddl	Signification asymptotic (bilatérale)	Signification exact (bilatérale)	Signification exact (unilatérale)
Khi-deux of Pearson		1.292 ^a	1	0.256	0.372	0.261
correction for continuity ^b		0.440	1	0.507		
Likelihood ratio		1.421	1	0.233	0.372	0.261
Fisher exact test					0.372	0.261
Number of valid observations		30				

a. 2 cell (50.0%) have a theoretical staff of less than 5. Theoretical minimum staffing is 2.20. b. Calculated only for a 2 × 2 table.

Table 3. Study of erectile dysfunction factor.

cross-tabulation erectile dysfunction * recurrence						
			Recurrence		Total	
			non	oui		
Erectile dysfunction	no	Number	10	12	22	
		% of erectile dysfonction	45.5%	54.5%	100.0%	
	yes	Number	1	7	8	
		% of erectile dysfonction	12.5%	87.5%	100.0%	
Total		Number	11	19	30	
		% of erectile dysfonction	36,7%	63.3%	100.0%	
Khi-deux test						
		Value	ddl	Signification asymptotic (bilatérale)	Signification exact (bilatérale)	Signification exact (unilatérale)
Khi-deux of Pearson		2.744 ^a	1	0.098	0.199	0.108
Correction for continuity ^b		1.508	1	0.219		

Continued

Likelihood ratio	3.085	1	0.079	0.122	0.108
Fisher exact test				0.199	0.108
number of valid observations	30				

a. 1 cell (25.0%) have a theoretical staff of less than 5. Theoretical minimum staffing is 2.93.

Table 4. Study of surgical procedure factor.

Cross-tabulation of urethroplasty * Récidive					
			Récidive		Total
			no	yes	
urethroplasty	non	Effectif	9	18	27
		%	33.3%	66.7%	100,0%
	oui	Effectif	2	1	3
		%	66.7%	33.3%	100,0%
Total	Effectif		11	19	30
	%		36,7%	63.3%	100.0%

Khi-deux test					
	Value	ddl	Signification asymptotique (bilatérale)	Signification exacte (bilatérale)	Signification exacte (unilatérale)
Khi-deux of Pearson	1.292 ^a	1	0.256	0.537	0.298
Correction for continuity ^b	0.255	1	0.613		
Rapport de vraisemblance	1.239	1	0.266	0.537	0.298
Fisher exact test				0.537	0.298
Number of valid observations	30				

a. 2 cell (50.0%) have a theoretical staff of less than 5. Theoretical minimum staffing is 2.20. b. Calculated only for a 2 × 2 table. Khi-deux of Pearson and Fisher exact test show that the dependence is not significant. $\chi^2 = 0.665$; ddl = 5; 1-p = 94%.

4. Discussion

Stenosis of the posterior urethra is the classic remote evolution of rupture or contusion of the urethra following trauma to it. The most affected age group in our study was between 20 and 39 years, with an average age of 38.33 years (**Figure 1**). These results are similar to those found by Eddahoui M.A in Morocco [5]. Ndour NS *et al.* [4] in Senegal found an average age of 58.7 years, with the most affected age group being 40 to 49 years. However, it should be noted that his study included all etiologies (inflammatory and traumatic) and all sites of stenosis (anterior and posterior). This age range found in our study can be

explained by the fact that young people are the population most affected by road accidents, which are the main cause of trauma to the posterior urethra (**Figure 2**).

The mode of revelation of urethral injury was dominated by acute retention of urine (ARU) present in 76.6% of patients, followed by dysuria (50%). Vladimir B *et al.* in the USA [6] found UAR in 91% of patients associated with urethral bleeding in 87%.

In our study, the stenosis was extended over 21.91 millimeters (mm) on average (14 - 40 mm), while Ndour *et al.* [3] found an average length of 17.3 mm. It was accompanied by bone involvement in 15 patients (50%). Diallo A.B *et al.* [7] found 56 patients (64.4%) with associated bone damage in 87 cases of trauma to the posterior urethra. These data confirm those of the literature which describe ruptures of the posterior urethra as a frequent complication of pelvic fractures.

Erectile dysfunction was present in 23 patients (23%). Aboutaieb *et al.* [8] in their study of 35 cases of trauma to the posterior urethra, divided into 2 groups according to the mode of management (delayed emergency repair group 1 or delayed repair group 2), found respectively 18.75% (3 cases out of 16) and 5.3% (1 case out of 19). Diallo *et al.* [7], who also divided their patients into two groups, found respectively 19.2% (5 cases) and 38.9% (14 cases) for groups 1 and 2. This disparity of results could be explained by the fact that in our study, all patients had a late repair, and the evaluation of erectile function was only done preoperatively (but at a distance, within 3 months after the trauma).

Terminal urethrogram was the main surgical technique used, followed by internal urethrotomy (60 and 30% respectively) (**Figure 3**).

Numerous studies have compared the two main surgical techniques (early endoscopic realignment and deferred terminal urethrogram) with results that remain controversial [9] [10] [11]. Boulma R *et al.* in Tunisia [5] found in a cohort of 30 patients, 85% of success in case of endoscopic realignment against 70% for deferred urethrorraphy. Jonathan N *et al.* in the USA [12] on a review of the literature on 29 articles evaluating erectile disorders, incontinence and the occurrence of recurrence according to the surgical technique adopted, found a significant statistical difference only for the occurrence of recurrence ($p < 0.1$), this being in favour of early endoscopic realignment. On the other hand, Qingsong Zou *et al.* [13] in China on a cohort of 522 patients, showed that early endoscopic realignment was associated with a greater number of secondary recurrences even if these stenoses were shorter and therefore reparable by endoscopic internal urethrotomy.

Barbara Cereda [8] in a multicenter study of 36 patients, shows that on clinically relevant criteria of rate of return to normal and definitive micturition, and time to achieve this, the results of deferred urethroplasty are better. It therefore recommends that deferred urethroplasty should be preferred; the place of early endoscopic realignment remains to be defined. In our study, no patient benefited from early endoscopic realignment because of their late management (on average three months after trauma). The recurrence rate in our study was 50%,

whereas Liberman D *et al.* in the USA [4] reported in a review of the literature on the follow-up of patients who had undergone posterior urethroplasty, recurrence rates of around 34%. The difference could be explained by the existence of reference centers for the management of pelvi-perineal pathology in the USA, which therefore have greater expertise. Koraitim [14] looked at the factors that can affect the long-term results of anastomotic repair of the posterior urethra. He concluded that the delay in management (minimum 4 months after the trauma), the surgical approach depending on the extent and location of the stenosis (perineal or abdominoperineal approach), the type of suture used for the anastomosis (3/0 in adults and 4/0 in children), in the case of a trans-pubic urethroplasty, the omental envelopment of the intra-abdominal segment of the bulbar urethra and of the anastomosis site, are the determining factors for the long-term success of the posterior urethroplasty. Bensouda A *et al.* in Morocco [15] and Anis J *et al.* in Tunisia [16], who studied terminal urethrorrhaphy by the trans-symphysis route, did not record any notable complications in the immediate postoperative period or in the long term. This leads them to conclude that this route can be an excellent approach for the treatment of complex lesions of the posterior urethra seen late.

All our patients operated on by terminal urethrogram had a perineal approach. Podesta *et al.* in Argentina [17] who studied the management of posterior urethral stenosis in children and adolescents, concluded from a review of the literature that deferred terminal urethrogramming (by perineal or trans-pubic approach according to the surgeons' preferences) remains the gold standard, the abdominoperineal approach will be reserved for complex lesions. Our cohort did not include any children. The review of the literature did not find any study correlating factors such as the location, number and extent of the stenosis and the occurrence of recurrence. Blaschko S.D *et al.* [18] examined the incidence of erectile dysfunction in pelvic fractures with urethral injury. In a review of the literature including 24 articles, he showed that 34% of the patients had initial erectile dysfunction and that depending on the surgical method used, early endoscopic realignment or delayed surgery, this percentage decreased to 16 and 3% respectively, thus favouring delayed surgery. The statistical analysis of the different factors studied, which were the characteristics of the stenosis (site, number, length), the associated lesions (bone fracture), the presence of erectile dysfunction, the surgical technique used; Analysis by Pearson's Chi-square test and Fisher's exact test showed that the dependence was not significant ($\chi^2 = 0.665$; $ddl = 5$; $1-p = 94\%$) [Tables 1-3], so that there was no correlation between the above-mentioned factors and the occurrence of recurrences after surgical treatment. The number of patients in the cohort is the main limitation of this study.

5. Conclusion

The medium and long term results of anastomotic repair of the posterior urethra

do not seem to depend on the lesion parameters of the stenosis (site, number, extent, presence of associated bony lesions or erectile disorders).

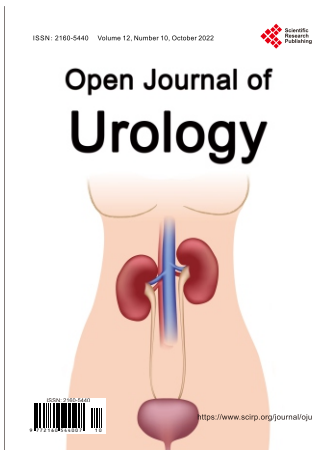
Conflicts of Interest

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

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