Scientific Research Publishing

Open Journal of Urology, 2025, 15(10), 510-530
https://www.scirp.org/journal/oju
ISSN Online: 2160-5629
ISSN Print: 2160-5440

Epidemiological, Diagnostic, Therapeutic Prognostic and Analytical Aspects of Urethral Stricture at the University Clinic of Urology-Andrology of the CNHU HKM of Cotonou from 2012 to 2023

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How to cite this paper: Inès, Y.D.M., Fred, H., Akim, K.D., Parfait, A., Jean, S., Al Fayad Toundé, A., Michael, A.M., Gilles, N., Khadidjatou, O. and Josue, A. (2025) Epidemiological, Diagnostic, Therapeutic Prognostic and Analytical Aspects of Urethral Stricture at the University Clinic of Urology-Andrology of the CNHU HKM of Cotonou from 2012 to 2023. *Open Journal of Urology*, **15**, 510-530.
https://doi.org/10.4236/oju.2025.1510052

Received: June 15, 2025
Accepted: October 28, 2025
Published: October 31, 2025

Abstract

Introduction: Urethral stricture is the dominant cause of obstructive pathology of the lower urinary tract. This condition results from several mechanisms and can be the source of several serious complications, including renal failure, urinary tract infections, and urinary stones. This study aims to review the diagnostic, therapeutic, and prognostic aspects of urethral strictures at the CNHU-HKM in Cotonou over the past twelve years. **Patients and Methods:** This was a retrospective, descriptive, and analytical cross-sectional study examining the epidemiological, diagnostic, therapeutic, and prognostic aspects of urethral strictures at the CNHU-HKM in Cotonou from 2012 to 2023, which took place from December 28, 2023 to January 24, 2024. **Results:** The study involved 119 medical records, representing an annual frequency of 9.91 cases. The male sex predominated (98.23%). The average age of the patients was 47.5 years, with extremes of 7 years and 88 years. 91.23% of the cases were from Benin. Dysuria was the most frequently found sign (68.04%). A history of urethral stricture was found in 19.30% of patients. On the paraclinical level, UCRM was the most frequently performed examination (75.63%). The anterior urethra was the most frequent site of strictures (55.46%) with a strong propensity at the level of the bulbar segment (27.73%). Compared to the impact assessment,

the ECBU was positive in 24.36% of patients and the most common colonies were successively: *Escherichia coli* (37.93%), followed by *Klebsiella pneumonia* (23.08%) and *Enterobacter clocae* (11.54%). A GFR < 15 ml/min/1.73m^2 was observed in 10.20% of patients, indicating end-stage renal impairment. Urethral strictures were of infectious (57.02%), traumatic (27.19%), and iatrogenic (15.79%) origin. In terms of treatment, endoscopic internal urethrotomy (31.93%) was the most common technique. The average hospital stay was 19.48 days, ranging from 1 to 280 days. The duration of urethrovesical catheterization was 18.56 days, ranging from 3 to 56 days. Regarding outcome, 41.18% of patients were lost to follow-up after expulsion. At hospital discharge, 33.61% of patients had regained comfortable urination. On the other hand, 16.80% of patients had at least one recurrence after 12.6 months. Currently, 5.88% still have a cystostomy catheter and 28.57% of patients contacted by phone still have normal and comfortable urination. **Conclusion:** Urethral stricture is a pathology affecting all ages, with multiple etiologies and a serious nature due to its recurring nature.

Keywords

Epidemiology, Diagnosis, Treatment, Prognosis, Urethral Stricture, Urethroplasty, Endoscopic Internal Urethrotomy

1. Introduction

Urethral stricture is an intrinsic and permanent reduction in the caliber of the urethra, creating a more or less significant obstacle to the evacuation of urine, causing the effort of pushing and a bladder that struggles in the long term. With the persistence of the obstacle, the bladder's distension capacity ends up being exceeded, and the bladder becomes exhausted and acontractile. Urine ends up stagnating there, promoting the development of stones, but also vesicoureteral reflux, which causes complications such as renal failure and kidney infections [1]. The etiologies of this pathology vary from one region to another. In developed and developing countries, they are iatrogenic. In Africa, the most common causes are infectious and traumatic [2]-[5].

This is a pathology whose prevalence in the world has varied greatly over time; it is around 0.9% in industrialized countries. Its hospital prevalence in Benin was 11.3% according to a study carried out in 2015 [2]. The management of this pathology has evolved over time, and it seems well codified. All the modalities, namely endoscopic internal urethrotomy, urethroplasty, and dilation with beniques, aim to restore the patency of the urethra [6] [7].

The disabling and recurring nature of this pathology reduces patients' daily lives to a costly "hospital pilgrimage". This research aims to assess the epidemiological, diagnostic, therapeutic, and prognostic aspects of urethral strictures at the University Clinic of Urology-Andrology (CUUA) of the Hubert Koutoukou Maga

National University Hospital Center (CNHU-HKM) from 2012 to 2023.

The overall objective of this study was to examine the epidemiological, diagnostic, therapeutic, prognostic, and analytical aspects of urethral strictures at the CUUA of the CNHU HKM in Cotonou.

More specifically, the aim was to:

- Describe the epidemiological and diagnostic aspects.
- List the therapeutic aspects.
- Describe the prognostic aspects.
- Establish a relationship between treatment types and therapeutic prognosis, as well as predictive factors for recurrence of urethral strictures (***New urethral stricture occurring after initial healing***) at the CUUA of the CNHU HKM in Cotonou.

2. Patients and Methods

2.1. Study Place

The study was conducted at the University Clinic of Urology-Andrology of the Hubert Koutoukou Maga National University Hospital in Cotonou.

2.2. Study Method

This was a retrospective, cross-sectional study, with a descriptive and analytical aim of examining the epidemiological, diagnostic, therapeutic, and prognostic aspects of urethral strictures at the CUUA of the CNHU-HKM in Cotonou from 2012 to 2023. We conducted an exhaustive recruitment of cases received during the study period whose medical records were usable, including data relating to the parameters studied: epidemiological (age, sex, occupation, marital status, and socioeconomic level), diagnostic (clinical signs, paraclinical signs, etiological diagnosis), therapeutic (surgical technique, post-operative results, patient satisfaction), and prognostic (recurrence, sequelae, and secondary complications). The term recurrence designates a ***new urethral stricture occurring after initial healing***.

The collected data were entered and analyzed using EPI INFO version 7.2 software. Results were entered as text in WORD software, and graphs were generated using EXCEL software.

From an ethical perspective, the identities of the patients included in the study remained confidential, research authorization was granted by the relevant hospital administrative department and informed consent from patients was obtained by phone call.

3. Results

Of the 177 files collected, 119 were retained (67.23%). The results obtained are as follows.

3.1. Epidemiological Aspects

Year of Admission: Table 1 shows the distribution of patients by year of admis-

sion. Over the 12 years, 119 cases of stricture were retained out of the 177 recorded, representing an annual incidence of 9.91 cases per year. Depending on the year, the prevalence of urethral strictures was higher in 2012, 2014, 2018, and 2020.

Table 1. Distribution of patients according to year of admission.

Year of admission	Frequency	Percentage (%)
2012	13	10.92
2013	6	5.04
2014	13	10.92
2015	7	5.88
2016	5	4.20
2017	9	7.56
2018	13	10.93
2019	10	8.40
2020	13	10.92
2021	10	8.40
2022	12	10.08
2023	8	6.72
Total	**119**	**100**

Patient Age: The mean age of patients was 47.5 years, ranging from 7 to 88 years. Table 2 shows the distribution of patients by age group. The most affected age groups were 20 to 35 years and 35 to 50 years, with a percentage of 25.21%, or 30 patients.

Table 2. Distribution of patients according to age groups (years).

Age groups	Frequency	Percentage (%)
<20	5	4.20
[20, 35[	30	25.21
[35, 50[	30	25.21
[50, 65[	21	17.65
[65, 80[	28	23.53
[80, 95]	5	4.20
Total	**119**	**100**

Patient Sex: The study included a total of one hundred and seventeen (117) men and two (2) women. A male predominance of 98.31% and a sex ratio of 58.5 men to one (1) affected woman.

Patient Marital Status: Table 3 groups patients according to marital status. The majority of patients were in a relationship (51.26%).

Table 3. Distribution of patients according to marital status.

Marital status	Frequency	Percentage (%)
Single	27	22.69
Couple	61	51.26
Divorced	2	1.68
Not specified	28	23.53
Widowed	1	0.84
Total	**119**	**100**

Patient Occupation: Figure 1 shows the distribution of patients by occupation. The most represented occupations were civil servants (16.81%) and artisans and manual workers (16.81%).

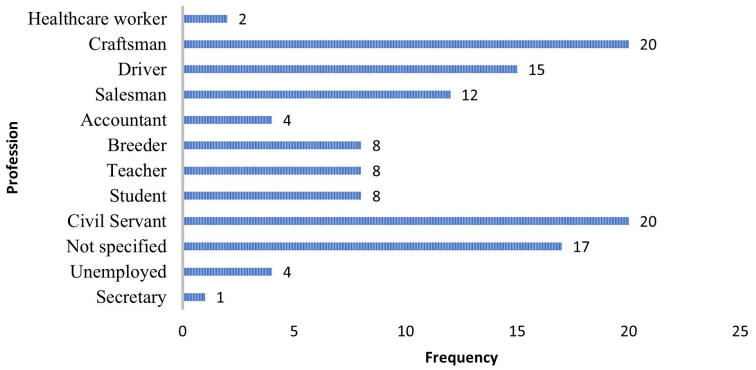

Figure 1. Distribution of patients by profession.

Patient Education Level: Figure 2 groups patients by education level. The majority of patients were educated, with 43.85% having at least a secondary education.

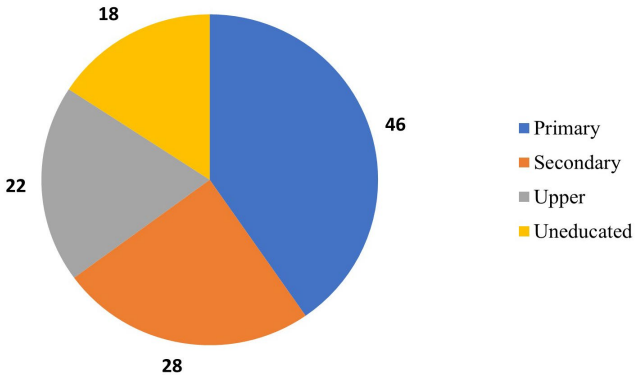

Figure 2. Distribution of patients according to education level.

Patient Medical History: Figure 3 shows the distribution of patients by medical history. Urethral stricture was the most frequently encountered medical history (18.49%), followed by hypertension (16.81%), urethritis, and pelvic trauma in the same proportions (13.45%).

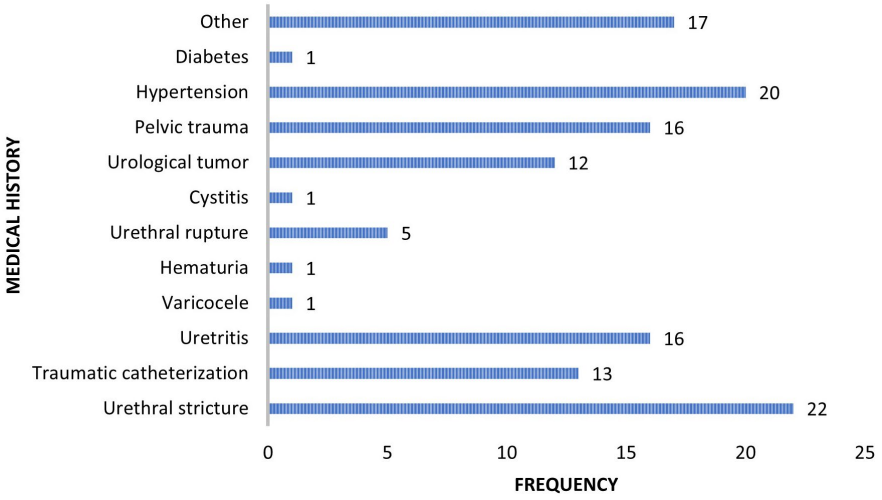

Figure 3. Distribution of patients according to medical history.

Patient Surgical History: Figure 4 shows the distribution of patients according to their surgical history. Surgical history was dominated by cystostomy (18.49%), abdominal surgery (11.76%), prostate surgery (10.08%), and urethroplasty (8.40%).

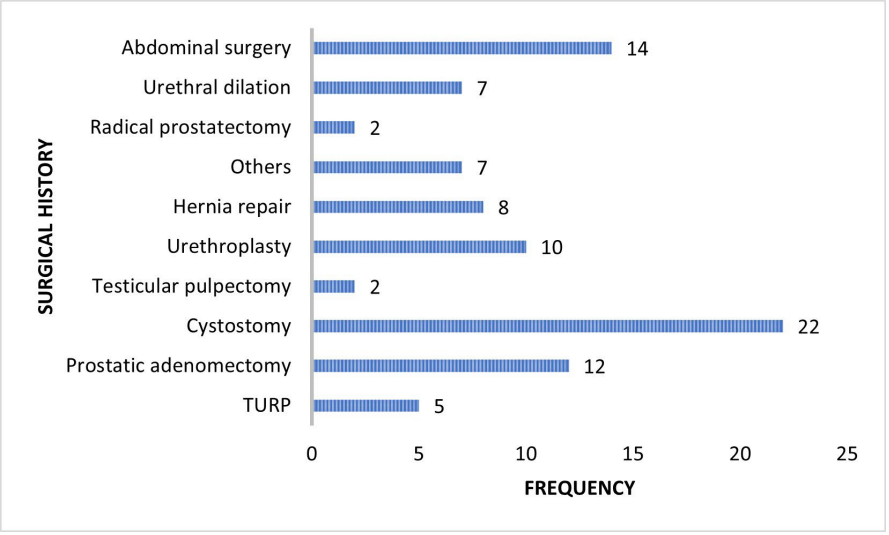

Figure 4. Distribution of patients according to surgical history.

3.2. Diagnostic Aspects

Functional Signs: Figure 5 shows the distribution of patients according to the functional signs that prompted the consultation. Dysuria was the dominant func-

tional sign (68.07%), followed by complete bladder retention of urine (40.34%) and weak stream (32.77%).

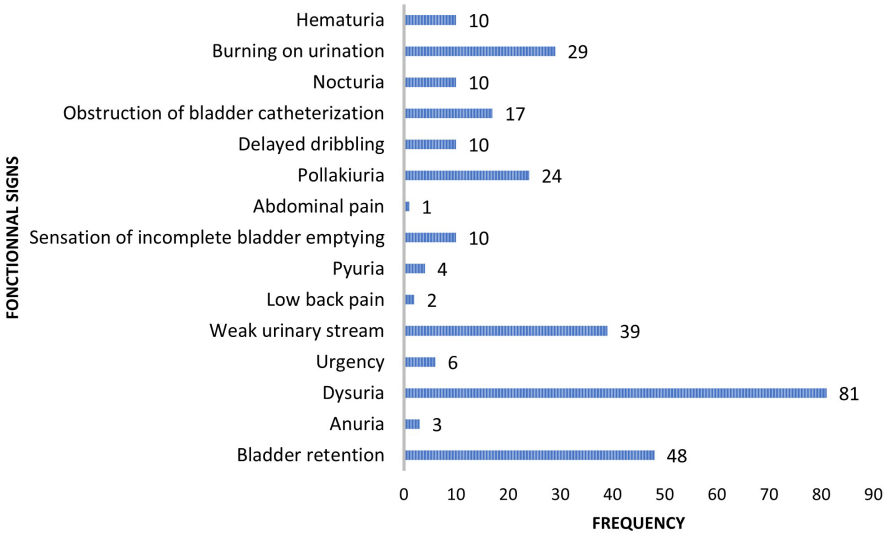

Figure 5. Distribution of patients according to functional signs.

Physical Signs

General Condition of Patients: Table 4 groups the patients according to their general condition. The majority of patients were in good general condition (83.19%).

Table 4. Distribution of patients according to general condition.

General condition	Frequency	Percentage (%)
Altered	6	5.02
Good	99	83.19
Average	14	11.76
Total	**119**	**100**

Void Status at Admission: Table 5 shows the distribution of patients according to their voiding status at admission. 57.98% had dysuric urination, and 36.13% already had a cystostomy catheter.

Table 5. Distribution of patients according to their urination status on admission.

Urination status	Frequency	Percentage (%)
Dysuric	69	57.98
Normal	5	4.20
Cystostomy wearer	43	36.13
Urethrovesical catheter	2	1.68
Total	**119**	**100**

Digital Rectal Examination: Table 6 groups the male subjects according to the results of the digital rectal examination. The digital rectal examination revealed a benign-appearing pathological prostate in 19.66% of the male subjects.

Table 6. Distribution of patients according to the result of the digital rectal examination.

Digital rectal examination	Frequency	Percentage (%)
Not done	58	49.57
Normal	36	30.77
Pathological, benign appearance	23	19.66
Total	**117**	**100**

Clinical Signs: Figure 6 shows the distribution of patients according to clinical signs. The admission examination revealed signs of infectious complications in 12.61% of patients.

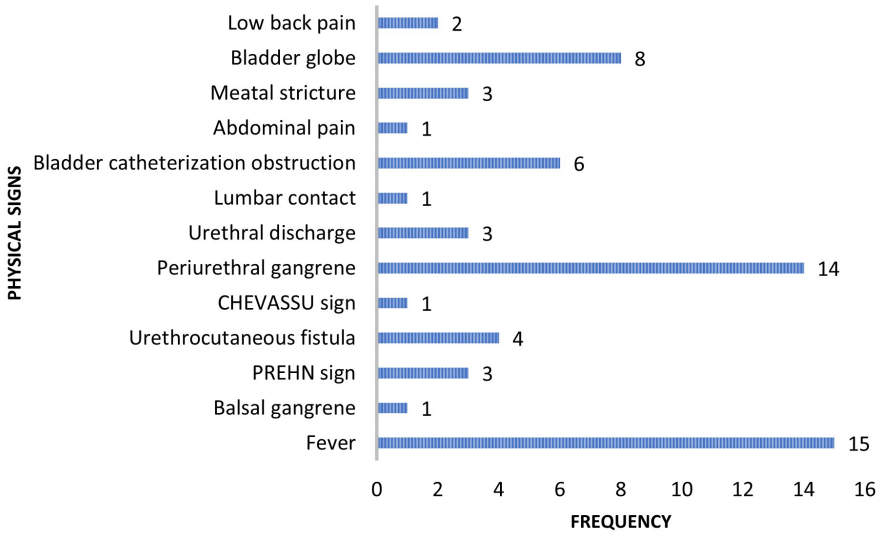

Figure 6. Distribution of patients according to physical signs.

Imaging

Type of Imaging: *Retrograde and micturition urethrocystography* was the most commonly used paraclinical examination for diagnosis (75.63%), followed by cystoscopy to a lesser extent (4.20%). An intraoperative diagnosis of urethral stricture was made in 2.32% of patients. Cases of meatal stricture did not require imaging.

Topographic Diagnosis: Table 7 groups the patients according to the site of the stricture. 56.66% of strictures were found in the anterior urethra, with a high prevalence in the bulbar segment and the bulbo-penile junction.

Biology

Patient Urine Culture Results: The urine culture was positive in 24.36% of patients. It identified certain organisms listed in the table below.

Table 7. Distribution of patients according to the location of the stricture.

		Frequency	Percentage (%)
Anterior urethra	*Spongy urethra*	17	14.91
	Bulbar urethra	33	27.73
	Penile urethra	11	9.64
	Urethral meatus	5	4.38
Mixed portion of urethra	*Bulbomamembrane urethra*	8	6.72
Posterior urethra	*Membrane urethra*	16	14.03
	Prostatic urethra	1	0.88
	Posterior urethra	8	6.72
Unspecified		20	16.80
Total		**119**	**100**

Germs Isolated in Urine Culture: Table 8 groups the patients according to the organisms isolated in the cytobacteriological examination of the urine. The most frequently isolated organisms were *E. coli* (37.93%) and *K. pneumoniae* (24.13%).

Table 8. Distribution of patients according to germs isolated in the urine culture.

Germs isolated in urine	Frequency	Percentage (%)
Acinetobacter	1	3.44
Other	2	6.89
Chlamydiae trachomatis	1	3.44
Enterobacter clocae	3	10.34
Escherichia coli	11	37.93
Klebsiella pneumoniae	7	24.13
Pseudomonas aeruginosa	2	6.89
Staphylococcus aureus	2	6.89
Total	**29**	**100**

Impact on the Upper Urinary Tract: Figure 7 shows the distribution of patients according to the glomerular filtration rate value calculated using the simplified MDRD formula. 10.20% of patients had end-stage renal disease.

Etiologies: Table 9 groups patients according to the cause of stricture. It was infectious in 57.98% of cases and traumatic in 26.05% of cases. The types of trauma are listed in Table 10.

The traumatic origin was dominated by post-trauma pelvic trauma (66.74%). The iatrogenic origin of urethral strictures is listed in Table 11. The iatrogenic origin was dominated by traumatic catheterization.

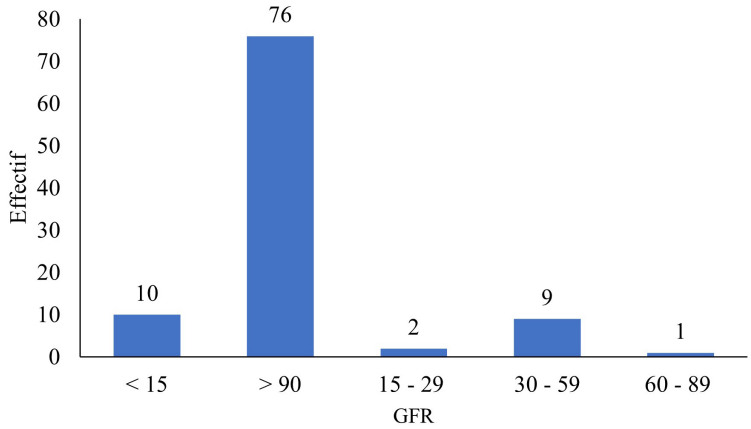

Figure 7. Distribution of patients according to GFR value.

Table 9. Distribution of patients according to the cause of the narrowing.

Cause of narrowing	Frequency	Percentage (%)
Traumatic	31	26.05
Infectious	69	57.98
Iatrogenic	19	15.96
Total	**119**	**100**

Table 10. Distribution of patients according to type of trauma.

Type of trauma	Frequency	Percentage (%)
Circumcision	1	3.22
Direct perineal impact	3	9.67
Straddling fall	5	16.13
Coital misstep	1	3.22
Pelvic trauma	21	67.74
Total	**31**	**100**

Table 11. Distribution of patients according to iatrogenic origin.

Iatrogenic origins	Frequency	Percentage (%)
Urethrovesical anastomosis	1	5.55
Condyloma cauterization	1	5.55
Bladder catheterization	11	61.11
Endoscopic treatment	3	16.67
Urethrovaginal fistula repair	2	11.12

Complications: **Figure 8** shows the distribution of patients according to complications secondary to urethral strictures. Complications associated with urethral strictures were found in 39.50% of patients. These complications were dominated

by recurrences, urethrocutaneous fistulas (8.40%), renal failure (7.56%), and urinary tract infections, such as acute pyelonephritis.

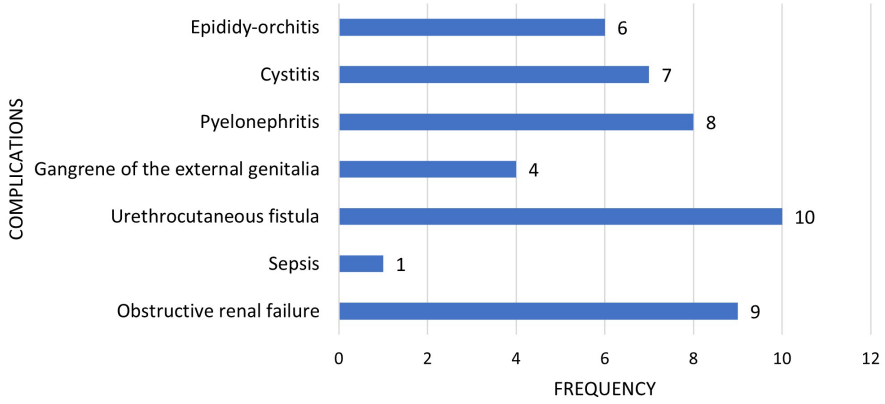

Figure 8. Distribution of patients according to complications.

3.3. Therapeutic Aspects

Therapeutic Indications

Table 12 groups patients according to therapeutic indication. Endoscopic internal urethrotomy was the most commonly used treatment (31.93%), followed by anastomotic urethroplasty (29.41%).

Table 12. Distribution of patients according to therapeutic indication.

Therapeutic indications	Frequency	Percentage (%)
Dilation	12	10.08
Meatoplasty	5	4.20
Lost to follow-up after cystostomy	14	11.76
Endoscopic internal urethrotomy	38	31.93
Anastomotic urethroplasty	35	29.41
1 stage urethroplasty	6	5.04
2 stage urethroplasty	9	7.56
Total	**119**	**100**

***Post-operative Urethral Dilation*:** Table 13 shows the distribution of patients according to the number of post-operative dilation sessions. The vast majority of patients (86.55%) did not undergo adjuvant dilation.

Table 13. Distribution of patients according to the number of post-operative dilations.

Number of post-operative dilations	Frequency	Percentage (%)
[1, 5[	9	6.72
[5, 10[	5	4.20

Continued

[10, 15[	0	0.00
[15, 20[	2	1.68
≥20	1	0.84
Aucun	103	86.55
Total	**119**	**100**

Therapeutic Outcomes

Void Status at End of Hospitalization: Table 14 groups patients according to their voiding status at the end of hospitalization. After treatment, 33.61% of patients had normal urination at hospital discharge. Furthermore, 38.66% were discharged with a urethrovesical catheter and scheduled for removal.

Table 14. Distribution of patients according to urination status at the end of hospitalization.

Urination status at the end of hospitalization.	Frequency	Percentage (%)
Dysuria	2	1.68
Normal urination	40	33.61
Cystostomy catheter wearer	24	20.17
UV catheter wearer	46	38.66
UV and cystostomy catheter wearer	7	5.88
Total	**119**	**100**

Therapeutic Outcomes: Table 15 shows the distribution of patients according to normal voiding status at hospital discharge, based on the therapeutic indication. Favorable outcomes, characterized by comfortable voiding, were found at the end of hospitalization in 30% of patients who underwent anastomotic urethroplasty.

Table 15. Distribution of techniques according to satisfactory therapeutic results.

Satisfactory therapeutic results	Frequency	Percentage (%)
Dilation	7	17.50
Meatoplasty	1	2.50
Lost to follow-up after cystostomy	3	7.50
UIA	11	27.50
Anastomotic urethroplasty	12	30.00
1-stage urethroplasty	3	7.50
2-stage urethroplasty	3	7.50
Total	**40**	**100.00**

Length of Hospitalization: Table 16 groups patients according to the length of hospitalization in weeks. A hospital stay of less than two weeks was observed in 52.1% of patients. The average length of hospitalization was 19.11 days, with a range from 1 to 280 days.

Table 16. Distribution of patients according to length of hospitalization.

length of hospitalization	Frequency	Percentage (%)
<1	34	28.57
[1, 2[	28	23.53
[2, 3[	17	14.29
[3, 4[	19	15.97
[4, 5[	11	9.24
[5, 6[	3	2.52
[6, 7[	1	0.84
[7, 8[	3	2.52
>8	3	2.52
Total	**119**	**100**

Time to Catheter Removal: The average time to catheter removal was 18.56 days, with a range from 3 to 56 days.

Discharge Method: Table 17 shows the method of patient discharge. The vast majority of cases (96.63%) returned home.

Table 17. Exit mode.

Exit mode	Frequency	Percentage (%)
Death	2	1.68
Normal discharge	115	96.63
Discharge against medical advice	1	0.84
Transfer	1	0.84
Total	**119**	**100**

Lost to Follow-up: After their hospitalization, 41.18%, or 49 patients, were lost to follow-up because they did not attend the follow-up or could not be contacted during this study. This was due to the lack of a functional number.

3.4. Prognostic Aspects

Recurrences: 16.80% of patients experienced a first recurrence of urethral stricture after 12.61 months, requiring a change in treatment in 66.67% of cases.

Post-operative Complications: Figure 9 shows the distribution of patients according to post-operative complications. Late post-operative complications were dominated by erectile dysfunction.

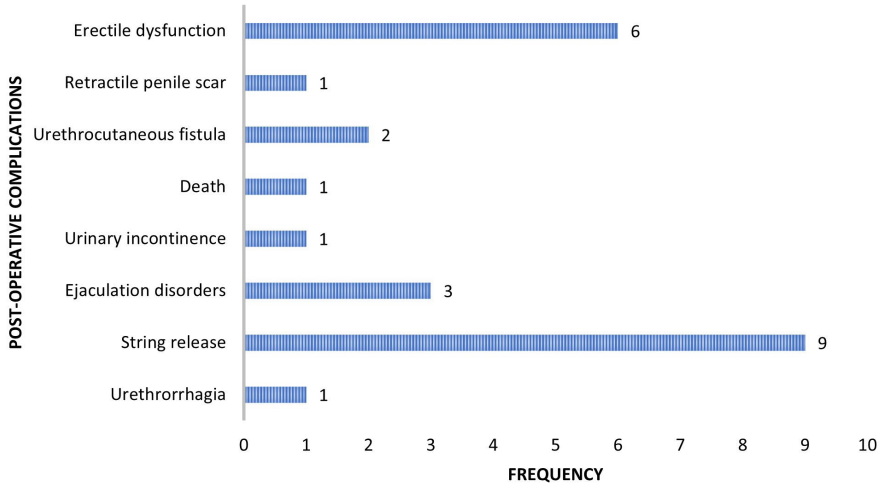

Figure 9. Distribution of patients according to post-operative complications.

Current Patient Status: **Figure 10** shows the distribution of patients according to their current status. Currently, 5.88% still have a cystostomy catheter, and 28.57% of patients contacted by phone still have normal and comfortable urination.

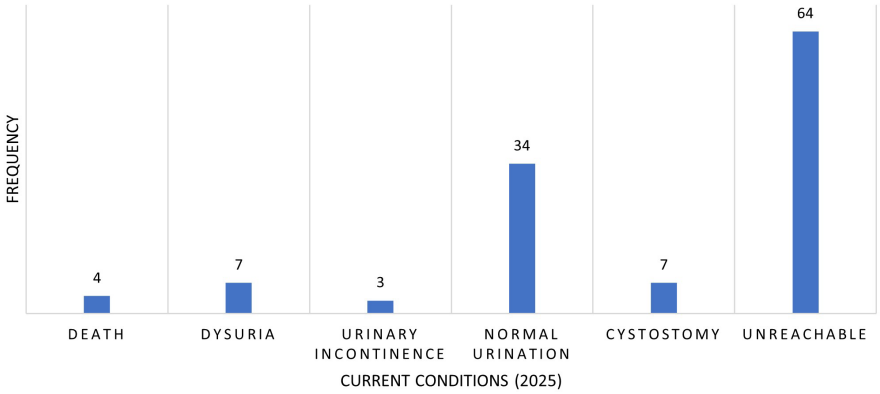

Figure 10. Distribution of patients according to their current condition in 2025.

3.5. Analytical Aspects

Relationship between therapeutic choice and recurrence: **Table 18** shows the distribution of patients according to the occurrence of recurrence based on therapeutic choice. There was no statistically significant association between therapeutic choice and recurrence (p-value = 0.13). However, of the 6 cases of first-stage urethroplasty performed, 50% were complicated by recurrence. Of the 12 cases that underwent dilation, 25% experienced recurrence. Of the 35 cases that underwent anastomotic urethroplasty, 20% experienced recurrence. Only 15.79% of endoscopic internal urethrotomies were complicated by recurrence. There were no cases of recurrence in patients who underwent 2-stage urethroplasty.

Relationship between Site and Recurrence: **Table 19** shows the distribution of patients according to the site of the urethral stricture and the occurrence of recur-

rence. There was no statistically significant association between the site of the first stricture and the occurrence of recurrence (p-value = 0.1359). However, recurrences were observed in 6/20 patients with stricture at the membranous urethra.

Table 18. Distribution of patients according to the occurrence of recurrence depending on the therapeutic choice.

Occurrence of recurrence depending on the therapeutic choice	Recurrence		p-value
	Yes	No	
Dilation	3 (3/20)	9 (8.16%)	
Meatoplasty	0 (0/20)	5 (5.10%)	
Lost to follow-up after cystostomy	1 (1/20)	13 (13.27%)	
Endoscopic internal urethrotomy	6 (6/20)	32 (32.65%)	0.13
Anastomotic urethroplasty	7 (7/20)	28 (28.57%)	
1-stage urethroplasty	3 (3/20)	3 (3.06%)	
2-stage urethroplasty	0 (0/20)	9 (9.18%)	
Total	**20 (20/20)**	**99 (100%)**	

Table 19. Distribution of patients according to the occurrence of recurrence depending on the location of the stricture.

Occurrence of recurrence depending on the location of the stricture	No recurrence		Recurrence		p-value
	Frequency	Fraction	Frequency	Fraction	
Unspecified	16	16.16	3	3/20	
Urethral meatus	5	5.5	0	0/20	
Penile urethra	10	10.10	2	2/20	
Spongy urethra	13	13.13	3	3/20	
Bulbar urethra	28	28.28	5	5/20	
Bullomembranous urethra	7	7.07	1	1/20	0.1359
Membranous urethra	10	10.10	6	6/20	
Membranous and prostatic urethra	7	7.07	0	0/20	
Prostatic urethra	2	2.02	0	0/20	
Total	**99**	**100.00**	**20**	**20/20**	

4. Discussion

4.1. Hospital Frequency

119 cases of stricture were identified out of the 177 identified, representing an annual incidence of 9.91 cases per year. This frequency is lower than the actual fre-

quency, as the rate of rejected and unretrievable cases was 32.77%.

4.2. Epidemiological Data

Age and Sex: In the present study, the mean age of patients was 47.5 years, ranging from 7 to 88 years. The most affected age groups were 20 to 35 years and 35 to 50 years, with a percentage of 25.21%. This result is superimposable to that of Hounnasso *et al.* in Benin, who found, in a study on the epidemiological and diagnostic aspects of male urethral stricture in the same department in 2015, a mean age of 44.4 ± 12.7 years with extremes of 10 years and 85 years [2].

Kaboré *et al.*, who report that the mean age of patients was 44.4 ± 16.8 years [Min 8, Max 80] [3]. Sikpa *et al.* in 2016 also found a mean age of 44.79 ± 15 years (18 and 77 years) in Togo [4]. The same is true for Guena *et al.* in 2019 in Cameroon [5]. Coulibaly *et al.*, in a study carried out in Mali in 2018 on the management of urethral strictures in men in the urology department of Gabriel Toure University Hospital, found similar results with a mean age of 43.06 years, with extremes of 06 and 65 years [6]. These results from the literature allow us to conclude that urethral stricture is a pathology of young adults. Furthermore, the study included a total of one hundred and seventeen (117) men and two (2) women; a male predominance of 98.31%. The higher frequency of urethral strictures in male subjects is not surprising. It is thought to be related to the fact that the male urethra is 4 to 5 times longer than the female urethra; therefore, a stricture along its course is more likely to occur. Furthermore, the consistently high incidence of sexually transmitted infections, associated with the anatomical layout of male subjects, where the urinary and genital tracts are intertwined, could explain the high predisposition of male subjects to developing this pathology.

Occupation and Education Level: The most common occupations were civil servants (16.81%) and artisans and manual workers (16.81%). The majority of patients were educated; 43.85% had at least a secondary education. The high frequency of civil servants is related to the availability of state-provided health insurance for this patient group. Furthermore, educated patients better understand the need for immediate access to modern healthcare. Uneducated patients often have a more complex healthcare pathway and only come to the hospital after visiting traditional healers and peripheral health centers.

Medical and Surgical History: Urethral stricture was the most frequently encountered medical history (18.49%), followed by hypertension (16.81%), urethritis, and pelvic trauma in the same proportion (13.45%). Surgical history was dominated by cystostomy (18.49%), abdominal surgery (11.76%), prostate surgery (10.08%), and urethroplasty (8.40%). The high frequency of these pathologies is linked firstly to the fact that stricture is a recurring pathology and then there is a high proportion of patients over 50 years old (44.74%), and therefore at risk of cardiovascular pathology.

4.3. Diagnosis

Functional Signs: Functional signs were dominated by lower urinary tract disor-

ders, with dysuria being the dominant functional sign (68.07%), followed by complete bladder retention (40.34%) and weak urinary stream (32.77%). Most African authors agree with us on this point and report that dysuria is the main functional sign. Hounnasso *et al.* reported in 2015 that dysuria (48.1%) and complete bladder retention (35.9%) were the main reasons for consultation [2]. Coulibaly *et al.* found similar results in 2018: dysuria (51.2%) and acute urinary retention (25.6%) were the most common reasons for consultation [6].

Physical Signs: The physical examination in our series found a benign-appearing pathological prostate in 18.75% of patients, a good general condition in 83.33% of patients, and 37.84% already had a cystostomy catheter. This is explained by the fact that urethral catheterization for complete bladder retention in urethral strictures often ends in failure, indicating a urinary diversion to relieve these patients who have the urge to urinate, who want to urinate at all costs, but are unable to.

Paraclinical Signs

Imaging: *Retrograde and micturition urethrocystography* was the most commonly used paraclinical examination for the diagnosis of urethral strictures in this series (75.63%). Cystoscopy was performed in only 4.20% of patients. An intraoperative diagnosis of stricture was made in 2.32% of patients. Cases of meatal strictures did not require imaging. This result is similar to that of Hounnasso *et al.*, who found a frequency of 87.73% for UCRM in 2015 in the same department [2]. Guena *et al.*, in 2019 in Cameroon, reached the same result [5]. Halidou *et al.* made the same observation [1]. Indeed, they report that "uretrocystography was the main complementary examination for the diagnosis; it made it possible to discover 63.79% of stenosis at the bulbar level. Our rate is close to those of Sikpa *et al.* and Ndour *et al.*, with 67.6% and 67.8%, respectively" [4].

These data from the literature allow us to conclude that retrograde uretrocystography is the first-line examination in the diagnosis of urethral strictures [7]-[18]. This is explained by the fact that retrograde urethrocystography allows for the precise determination of the location and length of the urethral stricture, which is of capital importance for management. However, some authors, based on several factors, including the accuracy of cystoscopy, as well as its great accessibility, lower cost, the familiarity of urologists with this technique, and the lower exposure to radiation, suggest using cystoscopy rather than urethrography for the initial diagnosis of urethral stricture [13]-[16]. These authors agree with Ouattara *et al.*, who, in a study conducted on the contribution of rigid cystoscopy to the diagnosis of lower urinary tract abnormalities and pathologies in Cotonou, concluded that urethrocystoscopy could be of invaluable value in the diagnosis of urological conditions and anomalies of the lower urinary tract in our context [12].

Biology: The urine culture was positive in 24.36% of patients. The most frequently isolated germs were *E. coli* (37.93%) and *K. pneumoniae* (24.13%). This result is superimposable with that of Halidou *et al.* in Niger in 2020, who reported: "The bacteriological examination of urine made it possible to isolate *E. coli* in 37.06%,

Klebsiella pneumoniae in 14.65%, Staphylococcus aureus in 8.62%, and P. mirabilis in 2.58%" [1]. In a 2015 study on obstructive renal failure (epidemiological and diagnostic aspects) involving 51 cases at the Cotonou National Hospital Center (CNHU), Natchagandé *et al.* reported that urethral stricture was the third most common cause of renal failure after prostate disease [8].

Topographical Diagnosis: 56.66% of strictures were found in the anterior urethra, with a high incidence in the bulbar segment and the bulbo-penile junction. The same observation was made in Benin in 2015 by Hounnasso *et al.*, who found that the stricture was located only in the anterior urethra in 73.6% of cases, with the bulbo-perineal urethra (63.2%) as the elective site [2]. Ndour *et al.* also reported in a 2018 study that the preferred site of stenosis is the anterior segment in 82.4% of cases, and the bulbar portion is the most affected [10]. Ouattara *et al.* in 2023 reached the same result [12]. This is also the case of Mouss *et al.* in Congo, who found 71% strictures at the level of the bulbar urethra [14]. This could be linked to the dimensions of the anterior urethra, whose length represents three times that of other segments in men. Therefore, a shrinkage would be more likely to occur in this segment compared to the others.

Etiological Diagnosis: In this series, the cause was infectious in 57.98% of cases, traumatic in 26.05% of cases, and iatrogenic (15.97%). This result is similar to that of Sikpa *et al.* in 2016 in Togo, where the etiology of urethral stricture was infectious in 55.9% of cases [4]. This is also the case for Ngaroua *et al.*, who reached the same conclusion [16].

Conversely, Abidi *et al.* in Pakistan in 2023 identified, firstly, traumatic causes (road accidents) (90.8%), followed by iatrogenic causes (post-transurethral resection of the prostate or post-prostatectomy stenosis), as the main etiologies of posterior urethral strictures. Infectious causes represent only 6.9% of cases.

The similarity of the results of the present study with those of African authors on the one hand, and the discordance with results from Europe and Asia on the other, suggests that the etiology of urethral stricture varies from one region to another [15] [17].

This difference in etiology between regions could be explained by the consistently high prevalence in our context of sexually transmitted infections due to unsavory sexual behaviors (multiple sexual partnerships), especially among young adults, who constitute the majority of the target population. Added to this, in our context, is the lack of management of infectious diseases that cause strictures, due to increasingly frequent resistance to antibiotics or poor therapeutic orientation.

4.4. Treatment

Endoscopic internal urethrotomy was the most commonly used therapeutic method (31.93%), followed by anastomotic urethroplasty (29.41%), and then dilation with a frequency of 10.52%. Ngaroua *et al.* in Cameroon in 2017 reached the same conclusion, with slightly higher proportions regarding the use of UIE in more than 58% of cases for the treatment of urethral strictures [16]. In their series, Kaboré *et al.*

identified skin flap urethroplasty and end-to-end anastomosis resection (ETAR) as the most commonly used treatments (58% of cases) [3]. This result is different from that of Coulibaly *et al.*, who reported in 2018 in Mali that "treatment was done by urethroplasty in 72.1% and by Beniqué dilation in 25.6%, endoscopic internal urethrotomy was not used" [6].

In our patients, several reasons would explain these therapeutic choices: on the one hand, the mastery of endoscopic practices and the fact that endoscopic treatment is accompanied by a short post-operative period with almost no surgical scar and considerably reduced long hospital stay. Data from the literature agree on the fact that urethroplasty resection anastomosis is the first-line treatment based on the benefit in terms of long-term costs (less reintervention) and the negligible impact on erectile function.

4.5. Prognosis

16.80% of patients experienced a first recurrence of urethral stricture after 12.6 months, requiring a change in treatment in 66.67% of cases. These literature data thus support the results of this series regarding the recurrent nature of this pathology. These recurrences of urethral stricture, even after adequate management, could be linked to the formation of scar tissue, thus leading to recurrences [14]-[17].

Post-operative Results

Normal urination was observed at hospital discharge in 33.61%, or 40 patients. Patients who underwent anastomotic urethroplasty constituted the largest proportion of this group, with a good outcome rate of 30%. However, a few cases of late post-operative complications were reported. These mainly involved erectile and ejaculatory dysfunction.

Literature data show higher success rates for anastomotic urethroplasty [4]. This is the case with Feddal *et al.*, with 69% satisfactory results [17].

Regarding complications. The erectile dysfunction reported in most of the literature could be related to the risk of intraoperative incidents such as damage to the nerves or blood vessels essential for erection [18]. Furthermore, surgery can disrupt the physiological mechanisms involved in erection, such as nerve control, penile arterial vascularization, and endothelial function. This, combined with risk factors such as diabetes, cardiovascular disease, smoking, depression, psychological disorders, and post-operative stress, increases the likelihood of erectile dysfunction after urethral surgery.

5. Conclusion

This study concludes that urethral stricture is a pathology that affects all ages. It is the result of traumatic pathology, infectious pathology (gonococcal urethritis), and is sometimes secondary to medical and surgical procedures (urethrovesical catheterization, endoscopic treatment, etc.). Management techniques have evolved over time. The post-operative course is sometimes fraught with complications. The results obtained are nevertheless satisfactory.

Conflicts of Interest

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

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