

# Management and Outcome of Urethral Strictures at Two Tertiary Health Facilities in Cameroon

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## Abstract

**Introduction and Objectives:** Urethral stricture is a reduction in the caliber of the urethral lumen impeding the outflow of urine. It predominantly affects males. The disease burden is severe in our milieu where access to specialized care is limited. Our goal was therefore to assess the management and outcome of male urethral stricture at two tertiary hospitals in Douala, Cameroon. **Materials and Methods:** This was a hospital-based retrospective study of patients managed for urethral stricture over 5 years (January 1<sup>st</sup>, 2017 to December 31<sup>st</sup>, 2021) at the Douala General and Laquintinie Hospitals. Data on sociodemographic, clinical, paraclinical, and treatment options were extracted using pre-structured forms. Data was analyzed using Statistical Package for Social Sciences (SPSS) version 28. Statistical significance was set at p-value < 0.05. **Results:** We exploited 130 medical records. The mean age of patients was 46.5 years. Dysuria and weak urine stream were the major presenting complaints (63.8% and 23.8% respectively). The etiology of urethral stricture was iatrogenic in 42.3% of cases. The strictures were mostly single (89.8%), and the bulbar urethra was most affected (46.9%). 28 patients had urinary tract infections and the most frequently isolated germ was *E. coli* in 29.6%. Direct visual internal urethrotomy (DVIU) was performed in 42.3% of cases. Surgery, especially excision and primary anastomosis (EPA) was done in 28.5% of cases. Major complications were wound infection, acute kidney injury (AKI), and urethrocutaneous fistulae affecting 3.1, 2.3, and 1.5% of cases respectively. The recurrence rate was 17% with a mortality rate of 0.08%. **Conclusion:** Urethral stricture is common in our adult male popula-

tion. The cause is mainly iatrogenic and the bulbar urethra is most affected. Minimally invasive and open reconstruction are frequently used treatment options with significant recurrence rates in the long term.

## Keywords

Urethral Stricture, Management, Outcomes

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## 1. Introduction

Urethral stricture is an abnormal narrowing of the lumen of the urethra which hinders the flow of urine from the urinary bladder to the external milieu [1]. It is a condition that can occur in both sexes but is rare in females. Worldwide, male urethral strictures have a prevalence of 229 - 627 per 100,000 males, with 40/100,00 in the UK and 200,000 in the USA [2]. In Africa in general and Sub-Saharan Africa in particular, urethral stricture constitutes a burden for the population with a substantial impact on quality of life and health costs. However, epidemiological data on the condition is scarce.

Urethral stricture is common in adult males [3] and can develop throughout the length of the male urethra and have various aetiologies [4]. In high-income countries, the common etiology is iatrogenic with decreasing incidence [5] as compared to increasing incidence of external trauma and infections as common aetiologies in low-income countries [6]. Idiopathic aetiologies are uncommon.

Patients with urethral stricture usually present with progressive obstructive voiding symptoms depending on the severity of the stricture. The research conducted in 2019 by Nwaha *et al.* in Douala-Cameroon revealed that a weak urinary stream constituted 46.90% of presenting complaints, followed by urinary retention (26.5%) and hematuria (14.3%) [7].

Diagnosis of male urethral stricture is based on a detailed history and, a focused physical exam though limited and paraclinical workup [8]. Management is essentially surgical and depends on the location, length, and severity of the stricture [9].

In 2019, Irekpita *et al.* [10] reported that there was a delayed presentation in populations of Sub-Saharan Africa, which justified the high incidence of complications. Ignorance and poverty were the principal reasons. In addition, access to specialized services where appropriate diagnostic workup and treatment is available represents a major challenge in our milieu thus increasing the severity of the disease burden.

Data on the management and outcome of male urethral stricture is limited in Cameroon. Our study was therefore to assess the management of patients with this condition as well as highlight the outcome following treatment.

## 2. Materials and Methods

We conducted a retrospective descriptive hospital-based study at the Laquintinie

and General Hospitals in Douala Cameroon. These are two referral centers in the country's economic capital equipped with the necessary infrastructure to diagnose and manage urethral strictures.

Our study population consisted of all male patients who were diagnosed and treated for urethral stricture between January 1<sup>st</sup>, 2017 to December 31<sup>st</sup>, 2021 (5-year period). We exploited medical records (patient files, operating room registers, discharge, and follow-up reports) to obtain data on sociodemographic features, risk factors, clinical presentation, treatment modality received, and short-term outcomes following treatment. Files with relevant information were excluded in the final analysis.

The outcome variables were the presence of postoperative complications, improvement in urine flow rate on uroflowmetry, and recurrence within 12 months.

Pre-structured data extraction forms were used to assure homogeneity incomplete medical files were excluded from the study.

Ethical approval was obtained from the Institutional Review Board (IRB) of the Faculty of Health Sciences (FHS), University of Buea, and, administrative approvals from the directors of the institutions where the study was carried out.

Data was anonymized by personal codes. The data was entered into Statistical Package for Social Sciences (SPSS) version 28 and Microsoft Excel 2019 for statistical analysis. Results were presented and absolute values, percentages, tables, histograms and pie charts. A p-value < 0.05 was considered statistically significant.

### 3. Results

#### 3.1. Sociodemographic Features

Out of 161 eligible case files, 130 met the inclusion criteria with 74 (56.93%) from the General Hospital and 56 (43.07%) from the Laquintinie Hospital in Douala.

The mean of our study population was  $46.5 \pm 6.5$  years (range 3 months to 84 years).

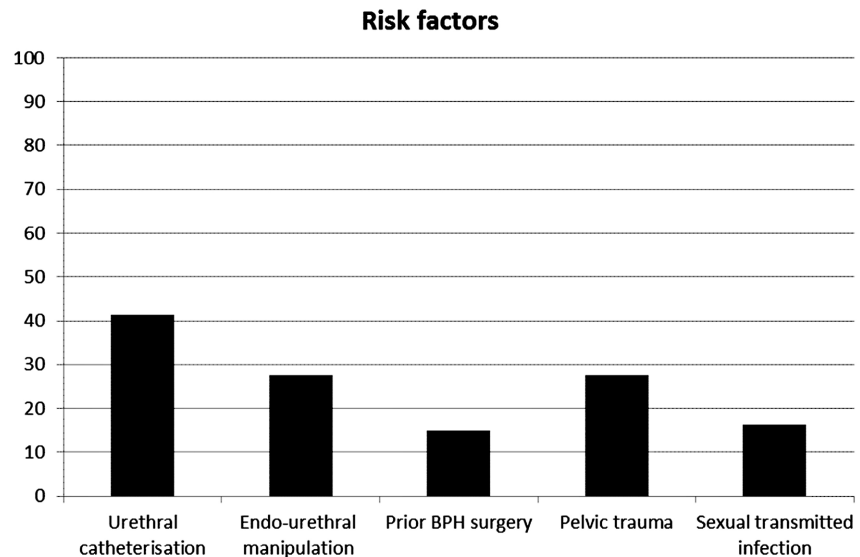
The most affected age group was 30-39 years (21.5%) as illustrated in **Table 1**.

**Table 1.** Distribution of patients according to age groups.

Age interval	Frequency	Percentage (%)
≤18 years	20	15.4
19 - 29 years	17	13.1
30 - 39 years	28	21.5
40 - 49 years	25	19.2
50 - 59 years	21	16.1
60 - 69 years	8	6.2
≥70 years	11	8.5
Total	130	100

### 3.2. Risk Factors

Risk factors for urethral stricture were present in 61.5% (n = 80) with prior STI and pelvic trauma/straddle injury found in 27.5% and 16.3% respectively (see **Figure 1**). Twelve cases (15%) had undergone prior surgical treatment for BPH, transurethral resection of the prostate in 4 (33%) and open simple prostatectomy in 8 (67%).



**Figure 1.** Risk factors for urethral stricture.

### 3.3. Clinical Features

A total of 100 patients (76.9%) presented at outpatient consultation within 1 month of symptom onset while 22 (16.9%) were referred and 8 (6.2%) came as emergencies usually within 6 months.

Dysuria was the most common presenting complaint reported in patients' files (63.8%), followed by a weak urinary stream (23.8%) and straining (13.8%) as shown in **Table 2**.

We found 22 (16.9%) patients with symptoms other than LUTS. They were mainly penile pain and swelling and urethrocutaneous fistula post-circumcision.

We had 35 (26.9%) patients who presented with acute urinary retention, 11 (8.5%) with chronic urinary retention, and 02 (1.5%) with overflow incontinence.

**Table 2.** Symptoms presented by our patients on entry.

Symptoms	Frequency	Percentage
Dysuria	83	63.8%
Weak urinary stream	31	23.8%
Straining	18	13.8%
Hematuria	12	9.2%
Incomplete emptying	7	5.4%

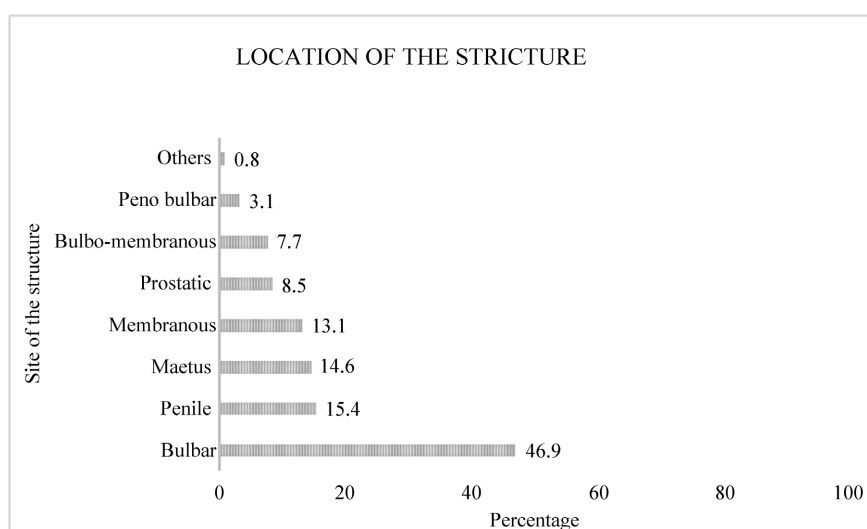
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Urgency	6	4.6%
Urethrorrhagia	4	3.1%
Intermittency	1	0.8%
Others	22	16.9%

**3.4. Paraclinical Workup**

Uroflowmetry was used to confirm a possible diagnosis of urethral stricture in only 23 patients with 69.6% having a flow rate of less than 10 ml/s.

Retrograde urethrogram/voiding cystourethrogram was used to identify the location, number, length, and severity of the stricture. A majority 89.8 % (115) of patients had a single stricture while 13 cases had multiple strictures. The bulbar urethra was the most commonly affected segment as shown in **Figure 2**. Stricture length was properly assessed in 26 patients and 17 (65.4%) were short (<2 cm).



**Figure 2.** Site of the stricture.

Among the 63 urine cultures reported, 55.6% were sterile, and 44.4% of patients had a urinary tract infection, for which they received an appropriate anti-biotherapy. *E. coli* was found in 29.6% (8) of patients, *Klebsiella pneumoniae* in 25.9% (7), *Staphylococcus aureus* in 18.5% (5) and *Neisseria gonorrhoea* in 14.8% (4) of patients. Other germs found were *Proteus mirabilis*, *Acinetobacter baumannii*, and *Staphylococcus hemolyticus*.

**3.5. Etiologies**

The most common etiology was iatrogenic in 55 (42.3%) cases followed by infectious and external trauma reported in 26.9% and 20.8% of cases respectively. This is illustrated in **Table 3**.

**Table 3.** Etiologies of urethral stricture.

	Etiologies	Percentage (%)
	Iatrogenic	42.3
	Idiopathic	10.0
	Infectious	26.9
	Traumatic	20.8

### 3.6. Management

Direct visual internal urethrotomy (DVIU) was the technique of choice for all short (<1 cm) anterior urethral strictures (42.3%). Other less invasive options employed for management were meatotomy (10%), urethral dilatation (12.9%) and urethral stent placement (3.2%). Cystostomy was used as an adjunct during urethral reconstruction to facilitate antegrade access.

Excision and Primary Anastomosis were the most used surgical methods, constituting 84.1% of surgical management and 28.5% of overall management as shown below in the **Table 4**.

**Table 4.** Surgical treatment modalities.

Technique used	Frequency	Percentage (%)
Excision and primary anastomosis	37	84.1
Pedicle flap	4	9.1
Buccal mucosa graft	3	6.8

Urethral catheterization was done intra-operatively with a silicone catheter. Duration of urethral catheterization was dependent on the approach used. The mean duration was  $10.31 \pm 6.08$  days ranging from 3 to 65 days. The most frequent duration of catheterization was 14 days (29.7%)

### 3.7. Postoperative Complications

Surgical wound infection, wound dehiscence, and scrotal hematoma were the most encountered early postoperative complications as depicted in **Figure 3**.

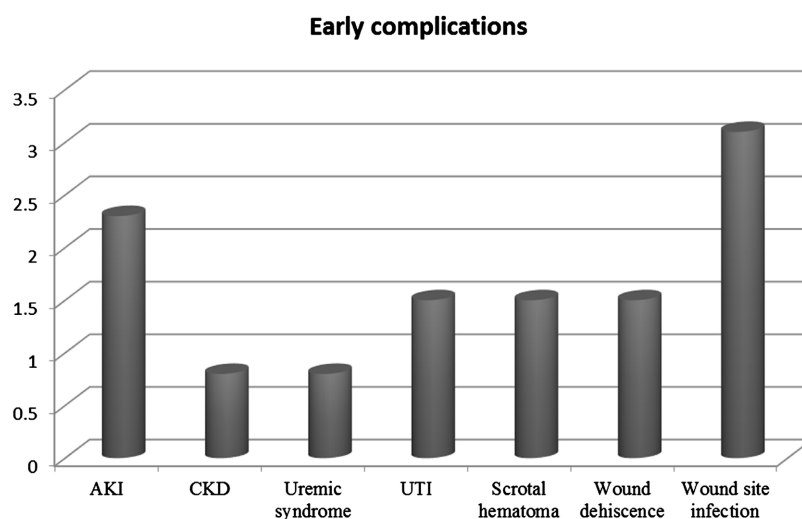
We had 23 cases of recurrence representing 17.7% of the study population. The mean time to recurrence was  $15.70 \pm 11.73$  months from treatment (1 to 48 months). Amongst the 23 recurrences, 9 (39.1%) occurred following DVIU, 10 (43.5%) following urethroplasty, and 4 (17.4%) following urethral dilatation.

Other long-term complications were cases 02 of urethra-cutaneous fistulae (1.5%) following a urethral dilation and excision and primary anastomosis and 01 cases (0.8%) of erectile dysfunction following excision and primary anastomosis.

The mean hospital stay was  $6.83 \pm 6.49$  days, ranging from 1 to 40 days.

We found that treatment modality did not influence the rate of recurrence. There was no statistically significant difference between a treatment modality

and time to recurrence (Tables 5-7)



**Figure 3.** Early complications of urethral stricture.

**Table 5.** Relationship between recurrence and urethral dilation.

Recurrence	Urethral dilatation (%)	N° (%)	p-value
Yes	3 (75)	11 (91.7)	0.383
No	1 (25)	1 (8.3)	
Total	4	12	

**Table 6.** Relationship between recurrence and DVIU.

Recurrence	Internal urethrotomy (%)	N° (%)	p-value
Yes	9 (100)	5 (71.4)	0.086
No	0 (0)	2 (28.6)	
Total	9	7	

**Table 7.** Relationship between recurrence and surgical management.

		Surgical Method		Total	
		No	Yes		
Recurrence?	no	Frequency	2	1	3
		%	13.3%	9.1%	11.5%
	yes	Frequency	13	10	23
		%	86.7%	90.9%	88.5%

p-value = 0.738.

### 3.8. Follow-Up

Follow-up by assessment of urinary symptoms and flow rates at 3, 6, and 12

months after treatment was available for less than 50% of the treated patients.

#### *Dilatation*

At 12 months, 3 of 4 patients who had urethral dilatation experienced a progressive reduction in their urine stream with peak flows < 10 ml/s.

#### *DVIU*

At 6 months, just 4 out of 17 (23.5%) patients treated with DVIU had flow rates of 21 - 30 ml/s.

While 6 (35.3%) had flow rates below 10 ml/s. Only 9 patients were followed till 12 months and 5 (55.6%) had flow rates of 11 - 20 ml/s while 4 (44.4%) voided at < 10 ml/s

#### *Surgical reconstruction*

A total of 9 patients treated surgically were followed till 6 months. Six (66.7%) had amelioration of the flow rate to 11 - 20 ml/s. After 12 months, 4 of 5 patients followed had no significant change in the flow rate. Only 1 patient had a flow rate > 15 ml/s.

There was no statistically significant difference between treatment option and flow rate within 12 months postop.

We had a total of 6 deaths during the follow-up period from unknown causes. One patient died during treatment giving a mortality rate of 0.08% (n = 1).

## **4. Discussion**

Urethral stricture is one of the earliest described urologic pathologies [11]. It is complex due to its complications and tendency for recurrence, which constitutes a concern for urologists in terms of choice of treatment. We found that urethral stricture represented 1.4% of our urologic consultations. This prevalence was higher than that found by Ngaroua *et al.* [11] [12] whose study showed urethral stricture in 0.6% of outpatient consultations. This could be explained by the fact that our study was conducted in two of the referral hospitals in the most populated city in our country. In our study, the mean age of patients was  $46.5 \pm 6.5$  years corresponding to the middle age group according to WHO [12]-[14]. The most affected age group was that of 30 - 39 years with a percentage of 21.5 %. These results are similar to those of a study carried out 4 years ago in DLH [20] and Kenya [15]-[17] where the mean ages were 47.6 and 43.1 years respectively.

In our work, there was a predominance of iatrogenic strictures (55.42%), followed by infectious causes (35.27%). Traumatic etiology represented 35.27 % and idiopathic 13.1%. Tritschler *et al.* [13] also found iatrogenic causes in 45% of strictures. This high percentage of iatrogenic strictures in our study probably results from frequent urethral instrumentation with repeated catheterization. That notwithstanding, a study conducted in Kenya by Makanga *et al.* [18] [19] highlighted infectious etiology in 40% of cases.

Though not life-threatening, urethral stricture is associated with a poor quality of life. It presents with lower urinary tract symptoms (LUTS) and patients may come already with complications. We found that patients presented mostly

with dysuria (63.8%) and weak urine stream (23.8%). These results are similar to those of Ngaroua *et al.* and Benjellou *et al.* who also had dysuria at 70.17% and 82% of the presenting symptoms [11] [19]-[22]. However, Nwaha *et al.* in a study conducted in Douala [9] found weak urinary stream as the main symptom in 46.9% of patients.

RUG/VCUG was the investigation of choice for diagnosing urethral strictures. Bulbar urethral localization of the stricture was the most frequent in 46.9%. Penile, meatal, and membranous strictures were found in 15.4, 14.6, and 13.1% of cases respectively. In Nigeria Akpayak *et al.* [14] reported rates close to ours with 56.3% of bulbar, 13.6 and 7.8% of penile and bulbo-membranous strictures respectively. A study conducted by Guena *et al.* [15] reported a higher rate of membranous strictures (81.8%). This may be because the majority of his study population were drivers and soldiers who were more prone to suffer from pelvic injuries.

We found that 89.8% of strictures were single and 10.2% were multiple. These results are almost similar to the findings of a study in Burkina Faso [23] where 80.3% of strictures were single and 19.7% multiple. However, the prevalence of single urethral stricture was 58% in a study conducted in Senegal [24]. This difference could be explained by the fact that the study focused mainly on patients with pelvic fracture-related urethral injury undergoing urethroplasty as compared to ours wherein all treatment modalities were considered.

A germ was isolated following urine culture in 44.4% in favor of a UTI. These findings are similar to the studies by Moby *et al.* and Nwaha *et al.* [9] [20]. *E. coli* and *Klebsiella pneumoniae* were the most frequently cultured organisms (29.6 and 25.9%). Kouame *et al.* [24] also reported *E. coli* as the most frequent causative agent as did Tengue *et al.* in Togo [8] who found *E. coli* in 61.5% of UTIs.

DVIU was the technique most used in our study. It represented 42.3% of all procedures. This goes along with the study of Ngaroua *et al.* [11] where DVIU represented 58% of all treatment methods used. Yet, Bah *et al.* [12] in his study reported urethroplasty was done in 67.5%. This difference could be explained by the fact that DVIU was systematically done for all new strictures less than 1cm long within the bulbar urethra in our referral centers having endoscopic equipment readily available.

In our study, urethral dilation represented 9.2% of all procedures. This was less than Ze Ondo *et al.* [18] who reported urethral dilation as the main technique used in 54% of cases. This could be explained by the fact that his study focused on iatrogenic urethral stricture, with a smaller sample size.

Surgical management was carried out for strictures > 2 cm and strictures resulting from pelvic trauma or recurrence following dilatation or DVIU. The main technique used was the anastomotic urethroplasty (excision and primary anastomosis), which represented 28.5% of all procedures. This is similar to the findings of Yaméogo *et al.* [23] who reported that 38.6% of cases underwent end-to-end anastomosis. However, Bah *et al.* [12] found that urethroplasty was done in 67.5% of patients. This higher percentage could be because his study fo-

cused on post-traumatic urethral strictures.

The duration of postoperative urethral catheterization ranged from 3 - 65 days, with a mean of  $10.31 \pm 6.08$  days. This was shorter than the findings of Kouame *et al.* [24] and Nwaha *et al.* [9] who reported a mean duration of  $11.55 \pm 11$  and  $14.7 \pm 9.4$  days respectively. This difference likely stems from the more frequent use of DVIU with a shorter duration of postop catheterization as compared to urethroplasty techniques in our study.

The most common complication we found was surgical wound infection, found in 3.1% of patients. Acute urinary retention, UTI, scrotal hematoma, and wound dehiscence represented 2.3, 1.5, 1.5, and 1.5% respectively. This is inferior to the findings of Ekeke *et al.* [1] who reported bleeding and wound infections in 22 and 22% of patients respectively following open urethral reconstruction.

We reported a recurrence rate of 17%. This is identical to the study by Makanga *et al.* [19] who also had a 17% recurrence rate. The recurrence rate was lower in a study by Van den Heever *et al.* [16] who found a 13% recurrence but quite high according to Tengue *et al.* [8] who had 22% stricture recurrence.

Our study illustrated that minimally invasive treatment using DVIU yielded fewer complications and better short-term improvement in urine flow rate than reconstructive surgical techniques. This goes along with the findings of Ngaroua *et al.* [11] who reported a success rate of 87.73% associated with DVIU. However, there was no statistically significant difference in flow rates and recurrence within 12 months for any of the treatment methods.

## 5. Conclusion

Urethral stricture is common in our adult male population. The cause is mainly iatrogenic and the bulbar urethra is most affected. *E. coli* is the most frequently cultured germ. Minimally invasive and open reconstruction are frequently used treatment options with significant recurrence rates in the long term.

## Conflicts of Interest

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

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