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Profile of Patients with Urethral Stricture Managed by Endoscopic Urethrotomy in Two Hospitals in Douala - Cameroon

Axel M Nwaha[1,6], Edouard M Moby[2], Landry W Tchuenkam[3*], Quentin A Essomba[4], Stéphane H Happy[5], Derboise M Biyouma[3], Bertin N Njinou[6] and Angwafo Fru III[3]

[1]Urology unit, Department of Surgery, Douala Laquintinie Hospital, Cameroon

[2]Faculty of Medicine and Pharmaceutical Sciences, University of Douala, Douala, Cameroon

[3]Faculty of Medicine and Biomedical Sciences, University of Yaounde I, Yaounde, Cameroon

[4]Douala General Hospital, Douala, Cameroon

[5]Higher Institute of Health Sciences, Yaounde, Cameroon

[6]Bali Medical and Surgical Urology Centre (BMSUC), Douala, Cameroon

[*]**Corresponding author:** Tchuenkam Wakheu Landry, Faculty of Medicine and Biomedical Sciences, University of Yaounde I, BP 5192 Yaounde, Cameroon. Tel : +237-691528498; Email: landrytchuenkus@gmail.com

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Abstract

Background: Urethral stricture in men is a narrowing cause by scarring of the urethra lumen and the surrounding corpus spongiosum which can occur at any point along the urethra. It is frequently encountered by urologists on daily practice. Suspected urethral stricture requests a rigorous clinical and paraclinical evaluation to determine the stricture cartography and potential life-threatening complications. Many therapeutic modalities are available, ranging from conservative or minimal invasive procedures, right to complex reconstructive operations.

Objectives: To describe the epidemiological, clinical, therapeutic and prognostic profiles of patients with urethral stricture treated by endoscopic urethrotomy.

Materials and method: We conducted a retrospective study over a seven-year period at two clinical sites: Douala General Hospital and the Bali Medico-Surgical Urologic Centre (BMSUC). All patients with urethral stricture managed with Direct Visual Internal Urethrotomy (DVIU) were included in our study.

Results: We evaluated a total of 49 cases. The mean age at presentation was 57.6 ± 14 years. The main presenting complaint was weak stream (46.9%). The most common clinical features were periurethral indurations in 16.3% of cases, a palpable bladder in 26.5% of cases. The diagnosis of urethral stricture was established following urethrocystography for all patients, which was performed in combination with cystoscopy in 10.9% of cases. The average length of stricture was 27.5 ± 18.7 mm with the vast majority occurring in the bulbar urethra (63.2%). Infections-induce strictures were reported in 51.1% of cases. We were performing our surgeries mostly under general anesthesia (57.1%) with a failure rate of 87.7% in total. Factors associated with recurrence were long, multiple and recurrent stricture disease.

Conclusion: The patient prognosis following DVIU correlate with his selection criteria. Among therapeutic modalities his clinical importance is recognized in the management of male urethral stricture. Patient's eligibility criteria for this procedure must be in accordance with guidelines.

Keywords: Douala; Endoscopic urethrotomy; Urethral stricture

List of abbreviation: BMSUC: Bali Medical and Surgical Urology Centre; DGH: Douala General Hospital; DVIU: Direct visual internal urethrotomy; SPSS: Statistical Package of Social Sciences; URCM: Urethrocystogram

Background

Endoscopic urology refer to minimally invasive surgical techniques allowing visual exploration of the internal upper and lower urinary tract normally inaccessible to the naked eye [1]. Practically, it involve insertion of an endoscope through a natural orifice including the urethral meatus when feasible or a percutaneous incision [1]; which is then directed through the urinary tract to the target area allowing exploration to study urinary tract anatomy, and view of tumoral lesion, infections or malformation [1,2]. Throughout history endoscopic urology have advance over time [1,3]. It progression date back from ancient time, to Hippocratic period in Greece till the 18th century when the first modern endoscope in medicine was introduced, it was known as "The Lichtleiter" [1] by Philipp Bozzini. The major change in this field occurred in 1950 with the concepts of flexible endoscopes and video camera [1,3]. Still date, ever-increasing and innovative upgrading in the physics, optic and imaging process fields lead to development of endourologic techniques allowing current urinary system exploration in all nook for diagnostic and therapeutic purposes [4,5].

Currently, endoscopic surgery in the field of endourology uses minimally invasive techniques in the treatment of set of urologic disorders (minimally-invasive surgery). Indications where efficacy has been proven are: resection of selected superficial urothelial tumors (kidney, ureter and bladder); resection of superficial neoplasm of urethra and obstruction due to prostate cancer [1]. Endourology also allows the evaluation and the management of the benign conditions such as: hematuria, urinary stone extraction whatever the location [4], prostatic adenoma resection without forgetting the diagnosis and treatment of urethral strictures [6].

Urethral stricture is a typically a male pathology. Its actual incidence in the general population is unknown [7]. In the at risk population mainly older men, an incidence of 0.6% was reported [8]. Urethral stricture refers to narrowing of a segment of the urethra as a result of spongiofibrosis of the surrounding corpus spongiosum [8]. The bulbar urethra constitute the preferential site for non-traumatic stricture [9]. Urethral stricture is divided into multiple aetiologies; which can be subdivided into iatrogenic, idiopathic, traumatic, infectious, inflammatory and congenital. Idiopathic (34%) and iatrogenic strictures (32%) are frequent aetiologies in high income countries [10]. Iatrogenic strictures are found as a result of trans-urethral instrumentation, traumatic placement of indwelling urinary catheters, long-term indwelling catheterization and reconstructive urogenital surgeries. In low to middle income countries, strictures are often related to sexually transmitted infections [11,12] or post-traumatic causes [8]. Blunt or penetrating trauma often affect the anterior urethra, while posterior urethral injuries most often occur in the course of a pelvic fracture (3-3.25% of cases) [8].

Urethral stricture has various clinical presentations. The most common presentation includes chronic obstructive voiding symptoms such as decreased urinary stream [13], incomplete bladder emptying, urine terminal dribbling, urine incompetency, urgency and urinary incontinence [7]. The patient may also present with complications [7]. Once we suspect urethral stricture, we need to proceed with contrast radiographic studies of the lower urinary tract. Urethrography (retrograde urethrogram or voiding cystourethrogram) remains the first exam for accurate assessment of urethral strictures in terms of diagnosis and staging [14,15]. Cysto-urethroscopy is considered as the diagnostic gold standard study [15]. Interest of ultrasound is identification of the location, length and severity (degree of spongiofibrosis) of the stricture [15]. Management of urethral stricture is essentially surgical. The main factors consider in decision making are based on probable complications related to the stenosis or the persistence of troublesome emptying symptoms. Several therapeutic options are available. The surgical approach depends on the location of the stenosis, as well as the length, etiology and severity [6]. Mini invasive techniques will be distinguished; urethroplasty can be done with or without autologous transplant and urinary diversion techniques as part of palliative treatment. Minimally invasive techniques include urethral dilatation and endoscopic urethrotomy. According to the results of a meta-analysis, none of these techniques have showed superior efficacy compare to the other in regard to stricture treatment [16]. Endoscopic urethrotomy is a fast and simple technique that can be performed under local anesthesia [17]. It constitutes the initial management for certain forms of urethral stricture [17] However, it remains less effective as well as it addresses a higher failure rate than urethroplasty especially in case of long and recurrent strictures [18]. Several studies in high to low incomes countries have evaluated the practice of endoscopic urethrotomy. Kimu in Tanzania [19] noted a 44.9% recurrence following endoscopic treatment of 227 patients. While Hagos in Ethiopia using more rigorous patients election for minimal invasive technique had a high success of 88.7% [20]. For than a decay in Cameroon, endoscopic urethrotomy has been one of the available therapeutic options for management of urethral stricture. There have been few studies done in our setting reporting the result of endoscopic urethrotomy technique. Therefore, we set as objective to describe the epidemiological, clinical and therapeutic profile as well as prognosis of patients treated by internal cold-knife urethrotomy in the city of Douala, Cameron.

Materials and Methods

Type of Study, Location, Duration of Study

This was an observational retrospective study. The study was conducted at the Urology Department of the Douala General Hospital (DGH) and the Bali Medico- Surgical Urology Centre (BMSUC). Both of these health facilities are reference center locate in the metropolitan economic capital of Cameroon. Both centers have adequate technical equipment for the management of urethral stricture by endoscopic urethrotomy. They have multidisciplinary surgical team including practicing urologist. The Douala General Hospital is category 1 reference hospital with a 320 beds capacity while the Bali Medico-surgical Urologic Centre is a private institution specializes in urological diseases. Data collection was retrospective over a period of 7 years (January 1, 2011 to December 31, 2017).

Study Population, Sampling, Inclusion Criteria, Exclusion Criteria

The target population included all male patients diagnosed or with a documented urethral stricture. This was a comprehensive sample, so all patients who met the selection criteria during the study period were recruited regardless of age or race.

- **Inclusion Criteria:** We included in the study any adult male patients who were simultaneously diagnosed with urethral stricture and underwent endoscopic management within the study period.
- **Exclusion criteria:** All patients with incomplete medical records who could not be contacted to complete the missing data were excluded from the study. Patients contacted who did not give their consent to complete the information; patients whose stenosis is of prostatic origin

Definition of Terms and Concepts

The cases had a definition of the following terms:

- **Urethral stricture:** A patient was considered to have urethral stricture if he had a symptomatic narrowing of the urethra with evidence of urethrography or urethrocystoscopy.
- **The site of stricture:** it was a function of its location on the urethra.
- **Therapeutic options:** Dilation or bougienage was defined as the widening of the urethral lumen using bougie or urethral dilators. Endoscopic urethrotomy was defined as the incision of the epithelium of the urethra and underlying scar tissue at the level of the stenosis by an endoscopic technique under visual control by cold knife or plasma. Urethroplasty or reconstruction of the urethra consisted of scar tissue excision with or without lumen augmentation using a flap or graft.
- **Operative definition of stricture:** it took into account the location of the stenosis, the length, the degree of spongiofibrosis.
- **Therapeutic Failure:** consisted of the recurrence of obstructive symptoms requiring second-line management (dilation, urethrotomy or urethroplasty).
- **Dependent and Independent Variables:** Our variable of interest was therapeutic failure. The independent variables were clinical (location of stenosis, length of stenosis, number of stenosis, degree of spongiofibrosis) and therapeutic (duration of transurethral urinary catheterization postoperatively).
- **Collection of Data:** Patient with urethral stricture who underwent endoscopic urethrotomy was consecutively selected from the database of registers. For each patient included in the study, we used a pre-tested data sheet to collect data.

Our parameters were collected as follows:

- Sociodemographic variable: age, level of education and occupation
- Diagnostic parameter: clinical presentation and workup
- Therapeutic: surgery and postoperative event

Data Management and Analysis

To ensure confidentiality patient information were coded. Data were collected using a structured questionnaire and immediately recorded in a computer using the CS Pro version 4.1 software. The data were analyzed by descriptive and analytic statistics methods using SPSS (Statistical Package of Social Sciences) software, version 21.0. Quantitative variables (age, length of stenosis, duration of catheterization) were expressed as mean with their standard deviation while qualitative variables were expressed as a percentage. Comparison of the proportions was done using the chi-square and Fischer test. We used the Student's test for the comparison of means. The alpha risk was set at the 5% threshold, so a value $p \leq 0.05$ was considered statistically significant.

Ethical Considerations

Ethical review of this study was done by Higher Institute of Health Sciences Institutional Review Board (IRB) of Universite des Montagnes. Authorization for research was obtained from both health facilities administrative authorities.

Results

A total sixty-three male patients were simultaneously diagnosed with urethral stricture and underwent endoscopic management during the study period. Of those we included forty-nine patients, 33 from DGH and 16 from BMSUC. We excluded

fourteen patients based on incomplete record and absence of consent. Socio-demographic characteristics of the study population (N = 49).

Considering a total of 49 cases, we identified patients aged 40-60 years as the most represented age group (55.1%, n=27). The ages of patient were ranging from 20 to 80 years with the mean age been 57.6 ± 14 years. The most common level of education among patient enrolled in our study was tertiary education (59.2%, n=29) (Table 1). Majority of patients had a permanent income (77.56%, n=38) while only 1 person was unemployed.

Socio- Demographic Characteristics		Number (n)	Frequency (%)
Age (Year)	[20-40]	14	28.6
	[40-60]	27	55.1
	[60-80]	7	14.3
	[80 or more]	1	2.0
	Total	**49**	**100.0**
Level of Education	Primary education	2	4.1
	Secondary education	18	36.7
	Tertiary Education	29	59.2
	Total	**49**	**100**
Profession	Official	13	26.5
	Remunerated employment	25	51.0
	Unemployed	1	2.1
	Retirement	5	10.2
	Pupil / Student	5	10.2
	Total	**49**	**100**

Table 1: Socio-demographic characteristics of patients with Urethral Stricture (N = 49).

Table 1 is a summary of the different socio-demographic characteristics. Clinical and paraclinical evaluation of patients (N = 49).

The clinical presentation of disease in our study was diverse. The main presenting complains were weak stream (46.9%, n=23), either acute or chronic urine retention (26.5%, n=13) and hematuria (14.3%, n=7) (Table 2).

Clinical Characteristics		Number (n)	Frequency (%)
Clinical presentation	Weak stream	23	46.90%
	Urine retention	13	26.5
	Hematuria	7	14.3
	Signs of infection	3	6.1
	Urethral fistula	3	6.1
	Decreased ejaculate/ Sexual dysfunction	0	0
Clinical finding on physical examination	Periurethral induration	8	16.3
	pus	4	8.1
	Palpable Bladder	13	26.5
	Urethral fistula	3	6.1
	No physical sign	15	30.6
	Suprapubic catheter	6	12.2

Table 2: Clinical characteristics of patients (n=49).

On physical examination 15 patients had no clinical features, of those with finding Periurethral indurations (16.3%, n = 8), and a palpable bladder (26.5%, n=13) were the most present features Table 2.

We had only 11 patients who performed uroflowmetry revealing a mean flow rate of 5± 3.22 ml/s (min: 01 - max: 10 ml/s). Contrast imaging studies were performed for all patients to confirm our diagnosis. Retrograde and Anterograde Urethrocystogram (URCM) were performed either alone or in combination with other radiographic investigation to visualize the opacification of the lower urinary tract for all patient. For five patients (10.9%), it was performed in combination with cystoscopy (Table 3). Regarding the number of strictures per patient, majority had a solitary lesion in 48.9% of case follow by multiple lesion in 26.5% of case then in 24.6% of cases, lesions were unidentified (Table 3).

Paraclinical findings		Number (n)	Frequency (%)
Opacification of lower urinary tract	UCRM¶ only	42	85.7
	UCRM + cystoscopy	5	10.2
	UCRM+ IUV$	2	4.1
	Total	**49**	**100**

Number of strictures in each patient	unique	24	48.9
	multiple	13	26.5
	missing	12	24.6
	Total	**49**	**100**
Site of stricture	Prostatic urethra	2	4.1
	membranous urethra	2	4.1
	Bulbar urethra	31	63.2
	Pendulous urethra	7	14.3
	Meatus	0	0
	Others*	7	14.3
	Total	**49**	**100**
Urine culture before surgery	Urine stérile	25	51.1
	E. coli	12	24.6
	Klebsiella sp.	4	8.1
	Salmonella sp.	3	6.1
	Pseudomonas sp.	3	6.1
	Citrobacter sp.	1	2.0
	Streptoccocus sp	1	2.0
	Total	**49**	**0**

***Others:** include pan urethral stricture and two or three site strictures; [¶]**UCRM:** urethrocystogram; [$]**IUV**: intravenous urethrography

Table 3: Para clinical findings of patients (n=49).

Most strictures were located in the bulbar region (63.2%, n=31), follow by pendulous urethra and "others" category (strictures located simultaneously in at least 2 different segments of the urethra) in 7 cases respectively. Several rings of strictures along the anterior and posterior urethra were consider as pan-urethra (8.2%, n=4) in our study Table 3.

We also had urethral stricture length as a study parameter, we were able to estimate it for 35 patients using UCRM. The average stricture length was 27.5 ± 18.7 mm (min: 10 mm - max: 65 mm).

Aetiology of Urethral Strictures

We identified three main aetiologies of urethral strictures in our study: post-infectious (51.1%, n=25), iatrogenic (28.5%, n=14), and traumatic (20.4%, n=10). There was no congenital cause among our patients. Most iatrogenic strictures were secondary to prolonged transurethral indwelling catheterization and prostatic endoscopic resection.

Therapeutic Data of Patients with Urethral Stricture

- **Number of Previous Endoscopic Treatment Received:** We counted 14 patients who has previously benefited from an endoscopic urethrotomy therapy. Therefore, majority of our patients (71.5%, n=35) underwent an endoscopic urethrotomy fort the first time. See Table 4.
- **Urine Culture:** Preoperative urine culture was systematic for every patient. Urine was sterile for most patients (51.1%, n=25) and for those who had an isolated germ in their sample, Escherichia coli (24.5%, n = 12) was the most encounter Table 3.
- **Type of Anesthesia:** In general, endoscopic urethrotomy was performed under general anesthesia (51.7%, n=28) while spinal anesthesia was use for the rest (42.9%, n=21).
- **Therapeutic Method Used:** All the patients in our study were operated by endoscopic internal urethrotomy using cold knife.
- **Iatrogenic Complications:** We had one complication due to the bistoury which was a false route that occurred after introduction of the instrument.

Postoperative Care

- **Postoperative Antibiotic:** We administer postoperative antibiotic therapy to 39 patients (79.6%) over a 10 ± 3 days period averagely. Quinolones were the most used antibiotic class.
- **Duration of Postoperative Catheterization**: A urinary catheter was placed following urethral stricture intervention for everyone. The mean duration of catheterization was 14.7 ± 9.4 days (min: 02 - max: 40 days). It lasted more than 21 days for 19 patients (38.7%) (Table 4).

Items		Number (n)	Frequency (%)
Number of previous endoscopic treatment received	00 previous DVIU (new cases)	35	71.5
	01 previous DVIU	9	18.4
	02 previous DVIU	4	8.1
	03 previous DVIU	1	2
	Total	**49**	**100**
Duration of postoperative catheterization	[17]	9	18.4
	[7-14]	10	20.4
	[14-21]	11	22.4
	[21 or more]	19	38.8
	Total	**49**	**100**

DVIU: Direct Visual Internal Urethrotomy

Table 4: Others clinical parameters.

Post-Operative Reported Complications

Recurrence (85.7%, n=42), erectile dysfunction (10.2%, n=5), and urine incontinence (4.1%, n=2) were the three complications we founded following endoscopic urethrotomy. This recurrence considers as DVIU failure. We had a mean period of reoccurrence of 6.6 ± 5.4 months (min: 02 weeks - max: 16 months). Factors associated with recurrence were: Stricture greater than 2 cm (p = 0.000); multiple stenosis (p = 0.005) and recurrent stricture (p=0.000). Following urethral stricture relapse, we use dilation with progressive larger dilators for 23 patients (63.9%) (Table 5).

Items		Number (n)	Frequency (%)
Time of recurrence of stricture (in months)	[0-1]	3	6.1
	[1-3]	15	30.6
	[3-12]	22	44.9
	[12 or more]	9	18.4
	Total	**49**	**100**
Types of operation performed after failure (N=42)	**DVIU**	5	11.9
	Urethroplasty	10	23.8
	Dilatation	27	64.3
	Total	**42**	**100**

DVIU: Direct Visual Internal Urethrotomy

Table 5: Postoperative events.

Discussion

The aim of our study was to describe the profile of patients with urethral stricture managed by endoscopic urethrotomy in two reference health facilities in Douala, Cameroon. We included 49 patients with a mean age of presentation been 57.6 ± 14 years. Most strictures were located at the bulbar region (63.2%, n = 31). There were 14 patients who had a previous DVIU prior to our study. The failure rate was 85.7% (n = 42).

Clinical and Paraclinical Features

Urethral stricture is a frequent among adult male. It may lead to severe complication which may lead to death from chronic kidney injuries or infection [7]. The clinical presentation of urethral stricture are multiple [7]. We had weak urine stream (46.9%) as the main symptoms in this study. Usually urethral stricture present either with chronic voiding or in the advance forms. Nearly 90% of patients present already with complication [21]. The main complications are recurrent urinary tract infection (as periurethral abscesses, epididymitis, prostatitis, cystitis, pylonephritis, sepsis, Fournier's gangrene); hematuria; stones, urethral fistula; acute urine retention, bilateral hydronephrosis and kidney dysfunction [7]. In addition to the patient's history, the physical examination of the patient must be rigorous and complete investigated [15]. An abdominal examination should be done to look for operative scars, presence and location of the suprapubic tube as well as the presence of palpable urinary bladder. On genital examination, we will look for: the presence of foreskin, lichen sclerosus [22], stenosis of the urethral meatus and urethral fistula. On palpation, it will be necessary to look for thickening or induration of the urethra through it course. This induration may indicate a periurethral abscesses or severe spongiofibrosis [15]. During our study, physical evaluation often revealed a palpable bladder (26.5%) and urethral induration (16.3%) as main features. There were also cases of fistula as well as the presence of a suprapubic tube (12.2%).

For urethral strictures diagnostic, initial imaging study we use was urethrography (retrograde urethrogram or voiding cystourethrogram) [14,15]. Cystourethroscopy is considered as the gold standard diagnostic investigation [15]. The cost of this exam imposes an additional expense on the overall management of urethral stricture. Only 10.2% of patients were able to do this test in our study. Indeed, a well-performed UCRM can to determine the site, length and number of stricture as well as the presence of any associated urethral pathology. All these features are essential for good endoscopic management. Cystoscopy can highlight the stenosis but does not allow determining the appearance of the urethra upstream. Urethral stricture is a complex pathology in regard to the management; the number, length, etiology and the sites of the stricture are considered as independent prognostic factors. In our study, bulbar lesions were the most common (63.2%) urethral

stricture site. The main aetiology of urethral strictures was post-infectious in 51.1% of cases. In high income countries, idiopathic and iatrogenic causes are the most common [7], while in middle to low incomes countries, infection causes are the most common [7]. In Nigeria, they account for 66.5% of cases [12]; 82.4% in Ethiopia [20] and 52.6% in Cameroon [23].

Management

During preoperative preparation, urine culture must be systematic for all patients [14]; as a fact, urinary tract infection is frequent (35-42%)strictures-related complications [7]. In this study, urine culture was sterile in 51.1% of cases. Of those with an isolated germ, Escherichia coli and Klebsiella Pneumoniae were the most encounter microorganisms. This result is similar to those reported by Deffo [24] and Ngaroua [23] in different localities in Cameroon; Escherichia coli was the main isolated microorganism in all their result respectively 30.1% and 21.05%.

Among our patients, 71.4% of them have never underwent a previous endoscopic intervention. We only endoscopic procedure performed within our study was Direct Visual Internal Urethrotomy (DVIU) using a cold knife. Despite been a simple procedure when perform by experience urologist, internal urethrotomy is no a benign intervention. Iatrogenic complications such as urethral hemorrhage, perineal hematoma, infection, scrotal edema, creation of a false passage that can lead to rectal perforation are possible [17].We noted a case of false route during the endoscopic procedure in our series, occurred as a management of a long stricture urethrotomy. Several anesthetic modalities are available to perform this surgical procedure: local anesthesia, local blocks, loco-regional anesthesia or general anesthesia [25]. In our study, general anesthesia was the most used anesthetic technique (57.1% of cases). At the end of our study, stricture recurrence rate following DVIU was 85.7% (n=42), this rate was high compare to those reported in similar conditions by Kimu in Tanzania [19] and Hagos in Ethiopia [20] who respectively had a failure rate of 44.9% and 12.2% respectively. These differences can be explained by the laxity of our patient's selection criteria compare to their studies. Out of all the cases of urethral stricture we had an average stricture length of 27.5 mm (oppose to 16 mm in Hago's study), 26.5% of patients' strictures were multiple (oppose to 9% in Kimu's study) and for 28.5% patients the urethral stricture reoccurred. A review of endoscopic urethral stricture management reported a high variation in success following a DVIU, which varies between 8 to 75 % bases on results of previous analytic studies in high incomes countries [18]. In addition to the anatomical urethral stricture considerations such number, site, length, other elements must be taken into account to explain this important difference in various DVIU success rate. These elements to take into consideration are the precise author definition of the DVIU failure or success [17], the presence of a preexisting urinary tract infection and the duration of postoperative follow-up. As a matter of fact, studies with a long follow-up period have shown a success rate close to 10-30%, while this rate rises close to 80% when the postoperative follow-up period is short [18]. Other independent failure factor such as age and obesity were reported [26].

Guidelines were established for improvement of endoscopic urethrotomy management. Therefore it the best approach for newly diagnose single, short(<2 cm, including adjacent spongiofibrosis), bulbar urethral strictures [14,17,18].

Limits of the Study

This study was hospital base study. It does not provide information on professional practices amelioration during the study period especially in regard to patients' selection criteria. There were incomplete medical data. As for the limited number of people included in this study, this may be related to the expensive cost of endoscopic urethrotomy in our society were health insurance are not effective. Nearly 77.56% of our study population had a permanent financial income, allowing them to benefit from this procedure. Endoscopic urethrotomy remains to this day a technique that few people can afford in our context.

Conclusion

Urethral stricture is a complex pathology. A rigorous clinical evaluation is imperative to determine the best therapeutic approach. No single procedure is appropriate for all types of urethral strictures in male patients. Endoscopic treatment is an option of choice, poor selection of patients leads inevitably to increase the reoccurrence rate, and therefore failure.

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