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Evaluation of the Quality of Micturition in Patients Who Underwent Anastomotic Urethroplasty at the Yaounde Central Hospital, Cameroon

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Abstract

Introduction: Radiological investigation which is the gold standard to perform following anastomotic urethroplasty in order to evaluate the quality of micturition is costly. In our context, due to financial limitations, reconstructive urologists prefer to use the uroflowmetry in order to assess the micturition post-surgery. Therefore, the objective of the study was to assess the quality of micturition using the uroflowmetry after anastomotic urethroplasty. **Methodology:** We conducted an 11-year retrospective review (1st January 2006-31st December 2017) and a cross-sectional descriptive observational study for a period of 8 months (November 2017-June 2018) at the Urology and Andrology Department of the Yaounde Central Hospital (YCH) of patients who were diagnosed with urethral stenosis and underwent an anastomotic urethroplasty at the YCH. We excluded patients who had incomplete files, patients lost to follow-up and did not do pre-operative uroflowmetry. Quality of micturition was evaluated using a uroflowmetry. Data was analyzed using EPI info 7.0. Parametric variables were reported as means and standard deviations and percentages and counts were used to report categorical variables. **Results:** We had a sample of 60 patients. The mean age was 42 ± 5 years with extremes ranging from 20 to 76 years. Twenty-seven (27) patients, or 45%, had no post-operative complications, and those who did had a urinary tract infection

(26.70%). In our series, we had 82% excellent results (patient satisfied with his urination with bell-shaped urinary stream and urinary flow greater than or equal to 15 ml/sec); 15% good results (patient with moderate dysuria with average urinary stream and urinary flow between 10 and 14.9 ml/sec) and 3% poor results (severe dysuria with urinary flow less than 10 ml/sec, urinary retention or urinary incontinence). Based on these results we can say that the success rate in our series was 97%. 96.70% of patients were satisfied against 3.3% who were not. **Conclusion:** Anastomotic urethroplasty is the gold standard for the treatment of short urethral strictures. The results are good in the immediate and long term post-operative period. The use of the uroflowmetry as a screening tool for evaluating the quality of micturition after urethroplasty is effective.

Keywords

Urethra, Stricture, Anastomotic Urethroplasty

1. Introduction

Urethral stricture is a complex disease that greatly affects the quality of life, and the goal of any treatment is to restore the patient's normal pattern of urination and to achieve a good or satisfactory quality of life [1]. Urethroplasty is considered the gold standard for the management of urethral stricture disease with excellent and sustainable successful reported rates [2].

Strategies for reporting stricture recurrence and success rate following urethroplasty range from subjective questionnaires like the International Prostate Symptom Score (IPSS), Quality of life score of the IPSS, the use of uroflowmetry and post-void residual urine [3] [4] [5]. Studies in Europe assessed the quality of life using the above mentioned tools in patients who underwent bulbar end-to-end anastomotic urethroplasty and found out that there was an in improvement in the maximum flow rate and more than 90% success rate [2]. In Sub-Saharan Africa, Charles Azuwike and colleague in 2015 had a 94% success rate [3].

Retrograde urethrocystography (RUG) and Voiding cystourethrography (VCUG) are the main investigations used in the diagnosis of urethral stricture as well to determine the recurrence of stricture post urethroplasty [6]. However, some studies have shown that using a uroflowmetry can adequately predict the recurrence or success rate of a urethral stricture following a urethroplasty [7].

In our context, RUG and VCUG are costly and sometimes logistically difficult to perform and expose men to radiation. So many reconstructive urologists have begun to use less invasive post-operative monitoring protocols such as periodic uroflowmetry or simply follow patient voiding symptoms and the outcomes were satisfactory. To the best of our knowledge, there is limited data on this subject in our context. Because of this, we set as objective, to evaluate the quality of micturition using the uroflowmetry in patients who benefitted

from an anastomotic urethroplasty at the Yaounde Central Hospital, Cameroon.

2. Methods

2.1. Study Design and Population

We conducted an 11 year retrospective review (1st January 2006-31st December 2017) and a cross-sectional descriptive observational study for a period of 8 months (November 2017-June 2018) at the Urology and Andrology Department of the Yaounde Central Hospital (YCH). Our study population were patients who were diagnosed with urethral stenosis and underwent an anastomotic urethroplasty at the YCH. Records of patients who underwent anastomotic urethroplasty were equally reviewed. We excluded patients who had incomplete files, patients lost to follow-up and did not do pre-operative uroflowmetry. Quality of micturition was evaluated using an uroflowmetry. Sociodemographic data, clinical features, characteristics of the stenosis, subjective patient satisfaction and results from the pre and post-operative uroflowmetry were collected using self-design structured questionnaires. The questionnaire was validated and the reliability tested prior to data collection. Data was collected by consulting patient records, post-surgical reports and by carefully observing the post-operative uroflowmetry procedure. Ethical clearance was obtained from the ethical committee of the Faculty of Medicine and Pharmaceutical sciences, University of Douala.

Quality of micturition was considered:

- Excellent: urination with no dysuria and patient is satisfied; uroflowmetry with bell-shaped urinary stream and urinary flow greater than or equal to 15 ml/sec.
- Good: urination with no dysuria and patient is satisfied and urinary flow between 10 and 14.9 ml/sec.
- Poor: Patient is not satisfied with micturition and urinary flow less than 10 ml/sec, urinary retention or urinary incontinence.

2.2. Uroflowmetry

1) Definition: Uroflowmetry is a simple, non-invasive diagnostic screening procedure used to measure the volume, flow rate in seconds, and length of time until completion of the voiding process [6].

2) Procedure

The test is carried out by urinating in a special urinal or with a machine fitted with a measuring device. Two techniques can be used [6]: (**Figure 1**).

- Weighing system flowmeter: which measures the change in weight of a container filling with urine during urination.
- Flowmeter using a rotating disc: urine flows onto a rotating disc and slows it down; the energy required to maintain a constant speed is proportional to the flow of urine.

- Preparation.

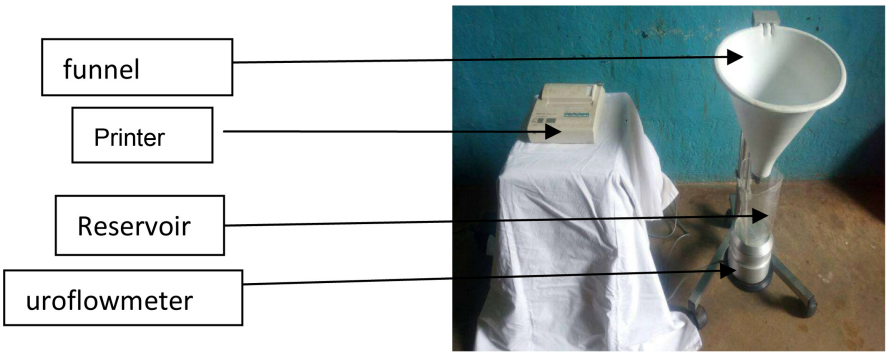

Figure 1. Uroflowmetry apparatus. (Source: Urology and Andrology department YCH.)

- The patient is asked to drink water in order to have a full bladder few hours before the test is performed.
- The patient is asked not to strain or exert abdominal pressure while urinating.
- The examination is carried out in a private room and the patient must feel a normal need to urinate.

2.3. Technique

The patient is asked to urinate into a funnel connected to an elecronic uroflowmeter. The uriflowmeter will record the urine output and flowrate on a chart which will be printed by the printer (**Figure 1**). The results were interpreted by a urologist.

Urine flow may be continuous or intermittent. The flow curve may have a harmonious shape in the form of a rounded arc ("bell curve"), or it may show fluctuations with numerous peaks during micturition ("polyphasic curve"). The shape of the flow curve depends on a number of parameters, in particular detrusor contraction, the presence or absence of abdominal thrust and any subcervical obstruction:

Terminologies used to interprete a uroflowmetry study include [8] (**Figure 2**).

1) Flow rate: volume of urine expelled through the urethra per unit of time. It is expressed in millilitres per second.

2) Urinated volume: total volume expelled through the urethra during micturition.

3) Maximum flow rate (Qmax): maximum flow rate recorded during micturition after eliminating any artefacts.

4) Micturition time: total duration of micturition, including any interruptions. When micturition is complete and uninterrupted, the micturition time is equal to the jet time.

5) Stream time: duration of the micturition stream.

6) Average flow rate: volume urinated, divided by the micturition time. The average flow rate must be interpreted with caution if micturition is interrupted or if there are end drops.

7) Time at maximum flow: elapsed time.

Figure 3 shows the different degree of obstruction on uroflowmetry.

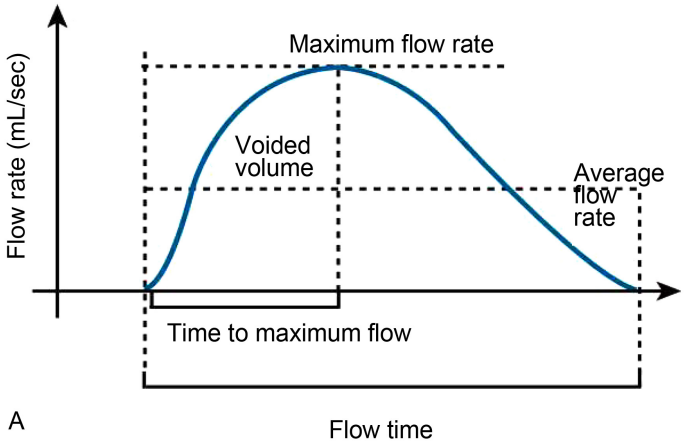

Figure 2. Normal bell-shaped flow curve rate versus time (source: Campbell walsh 11th ed.)

2.4. Statistical Analysis

Data was analyzed using EPI info 7.0. Parametric variables were reported as means and standard deviations and percentages and counts were used to report categorical variables.

3. Results

Overall, a total of 60 patients were included in the study (**Figure 4**).

3.1. Sociodemographic Characteristics

1) Age distribution

The mean age was 42 ± 5 years. The most represented age group was that of 30 - 50 years by 41.70% (n = 25) (**Table 1**).

2) Marital status

Almost half of patients were married (41.70%), 28.30% were in a common-law relationship and 15.00% were single (**Figure 5**).

3) Profession

Majority of the patients were working in the informal sector (n = 20) (31.5%) (**Table 2**).

3.2. Clinical Characteristics

1) Presenting Complaint:

Most of the patients presented with dysuria, weak stream, hesitancy and acute retention of urine accounted for (**Figure 6**).

2) Site of urethral stricture

Bulbar urethral stricture was present in 65% of our study population and a single urethral stricture was found in 100% of the study population (**Figure 7**).

3) Length of urethral stricture

68% of our patients had a urethral stricture of between 1 and 2 cm, while 32% had a length of less than 1 cm. The average length of the stricture was 1.21 cm

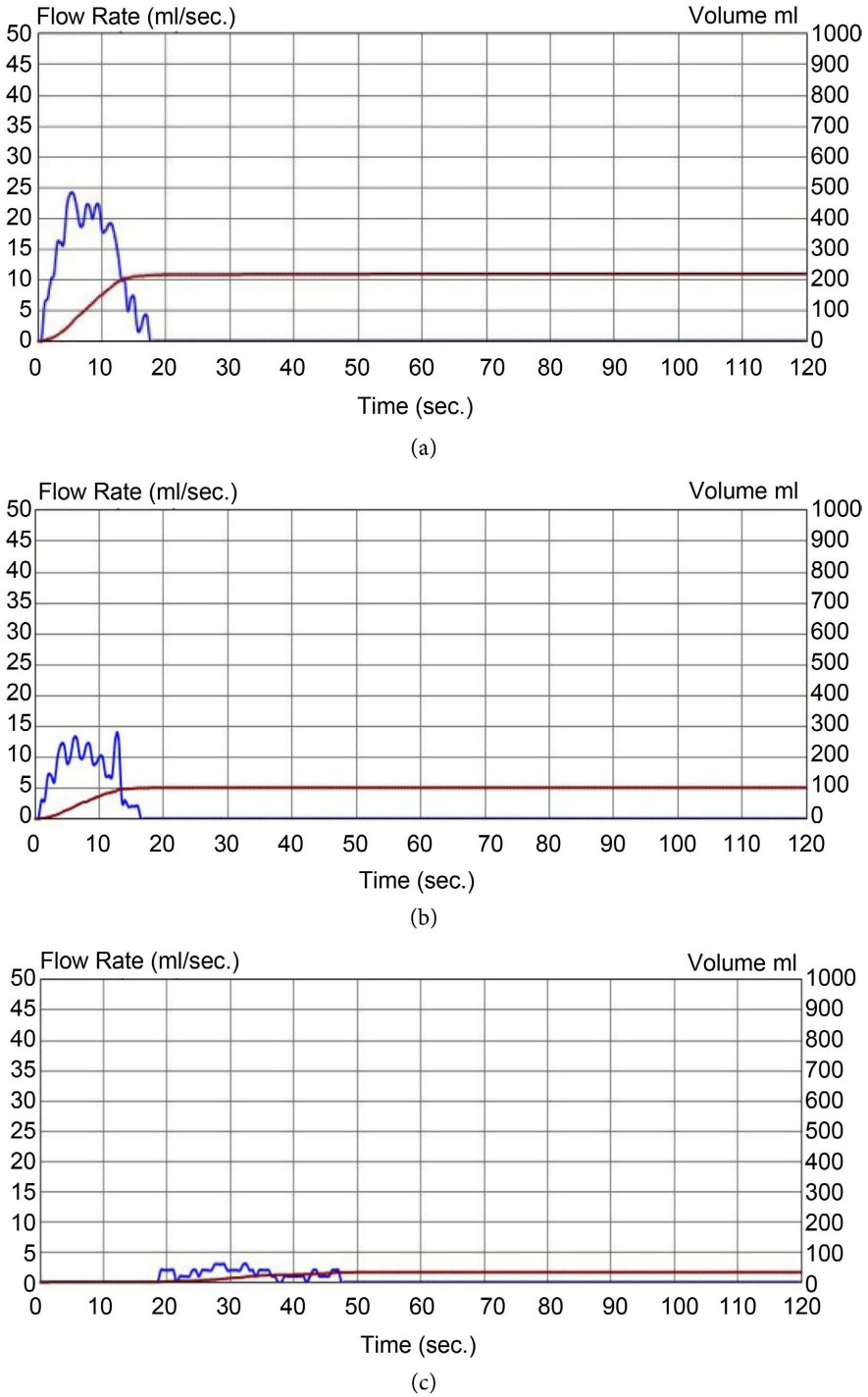

Figure 3. (a) Normal uroflowmetry result. (b) Uroflowmetry with a plateau curve: moderate obstruction of the lower urinary tract. (c) Urinary flowmetry with plateau curve: severe obstruction in case of urethral stricture (source: Urology and Andrology department YCH).

(**Figure 8**).

4) Pre-operative micturition

More than half of our study population (63.30%) had a maximum urine flow

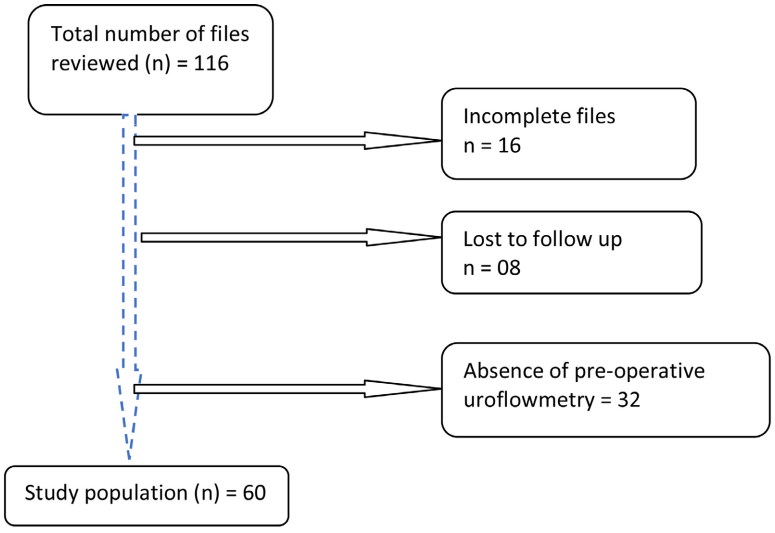

Figure 4. Study flow chart.

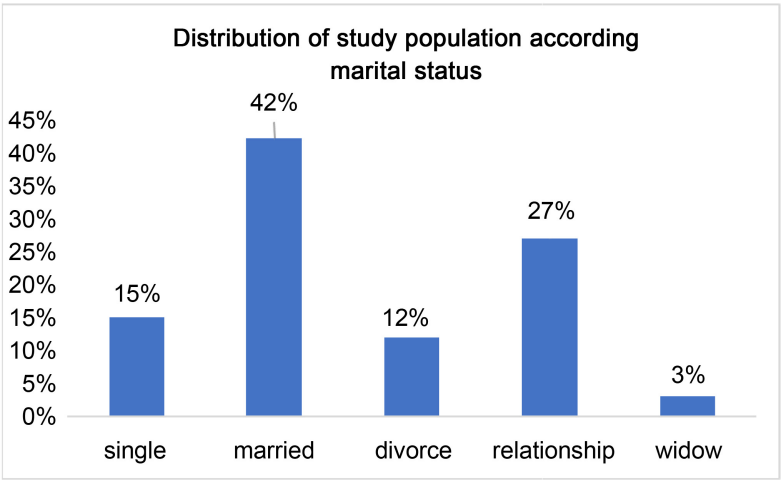

Figure 5. Distribution of study population according to marital status.

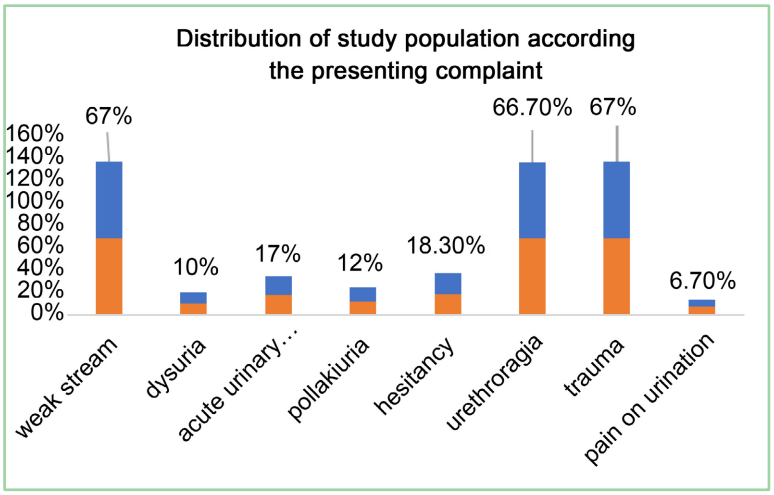

Figure 6. Distribution of study population according to the presenting complaint pre-operatively.

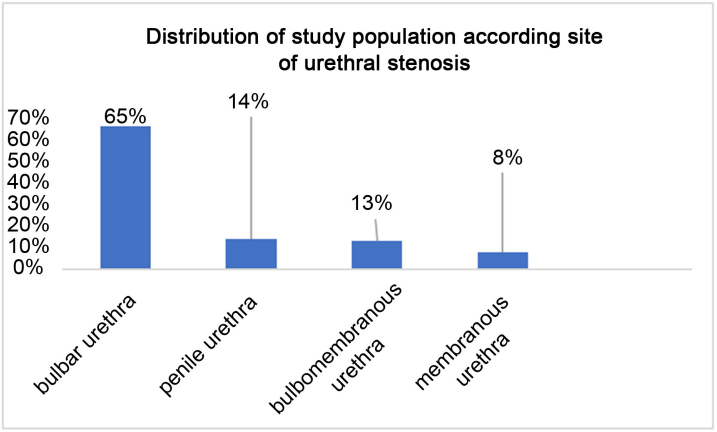

Figure 7. Distribution of study population according to the site of urethral stricture.

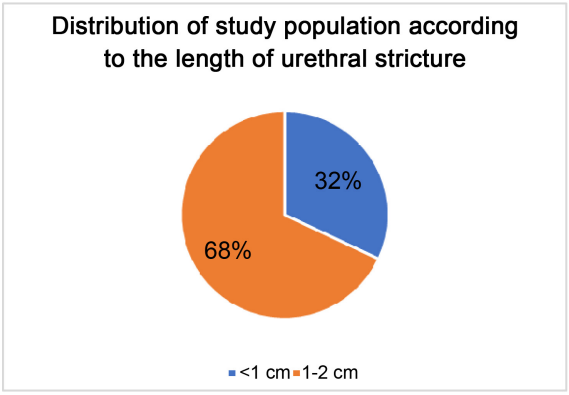

Figure 8. Distribution of study population according to the length of urethral stricture.

Table 1. Age distribution.

Age	Frequency	Percentage
<30	17	28.30
[30 - 50]	25	41.70
>50	18	30.00
Total	60	100.00

Table 2. Distribution according to profession.

Profession	Frequency	Percentage
Student	07	11.70
Private sector	07	11.70
Public sector	11	18.50
Business	10	18.30
Informal sector	20	31.50
Retired	05	8.30
Total	60	100.00

rate of less than 10 ml/s pre-operatively indicating severe obstruction of the lower urinary tract (Table 3).

5) Post-operative complications

Almost half the patients had no post-operative complications. For those who did, urinary tract infection was the most common complication (26.70%) (Table 4).

3.3. Post-Operative Micturition

82% of our study population had excellent flow rate, Qmax > 14.9 ml/s (Figure 9).

Table 3. Pre-operative uroflowmetry in the study population.

Pre-operative Qmax	Frequency	Percentage
<10	38	63.30
[10 - 14.9]	22	36.70
Total	60	100.00

Table 4. Post-operative complications in the study population.

Post-operative complications	Frequency	Percentage
None	27	45.00
urinary tract infection	16	26.70
Urethral fistula	10	16.70
Wound infection	4	6.70
Lower urinary tract symptoms	2	3.30
Recurrent urethral stenosis	2	3.30

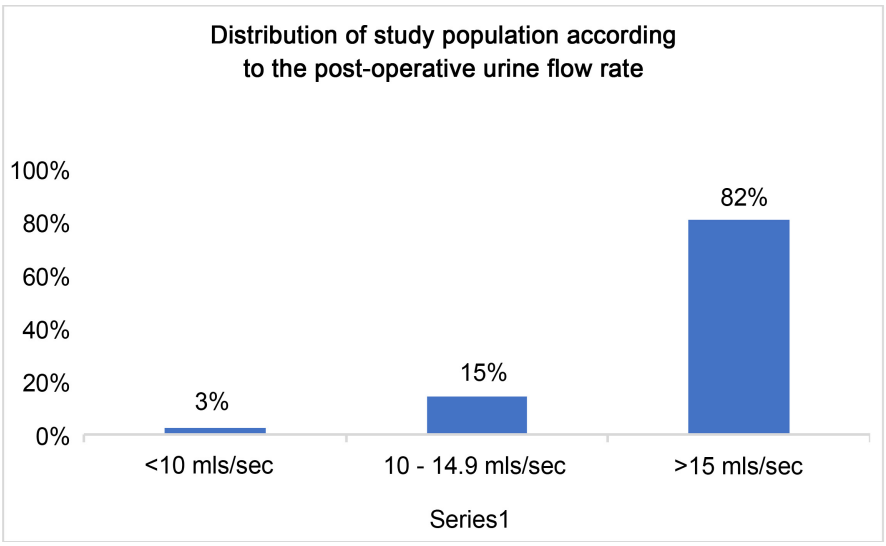

Figure 9. Distribution of study population according to the post-operative urine flow rate.

3.4. Patient Satisfaction

97% of our study population were satisfied with their micturition following anastomotic urethroplasty. 3% of the population were not satisfied because there was recurrence of the stricture.

4. Discussion

Radiographic investigation following urethroplasty shows excellent details of a reconstructed urethra [6]. It can also provide peace of mind for the surgeon and the patient since it vividly shows a widely patent urethra following a successful repair. However, in the era of cost conscious minimally invasive medicine, we pose the question as to whether RUG/VCUG is really necessary to perform post operatively given that there is a more than 90% success rate in addition to exposing patients to radiation. It was in this light that the purpose of our study was to evaluate the quality of micturition using the uroflowmetry in patients who benefitted from an anastomotic urethroplasty.

The mean age of our study population was 42 ± 5 years. The age group most represented was 30 - 50 years. These results are in line with those obtained by Sikpa *et al.* in 2015 in Togo [9]. This age group is highly sexually active and is also affected with pelvic injuries following road traffic accidents.

Dysuria, weak stream, hesitancy and acute retention of urine were the most reported symptoms at pre-operative consultation (**Figure 6**). This is in accordance with other studies carried out in Sub-Saharan Africa [10] [11] [12].

Majority of the patients in our series had a single bulbar urethral stricture (65%) (**Figure 7**). Several studies reported similar findings [13] [14].

Sixty eight percent of the study population had a stricture length between 1 - 2 cm with an average of 1.2 cm. Studies in Sweden and Mali had similar findings [15] [16]. This observation was the key determining factor in choosing the method of urethroplasty.

Pre-operative uroflowmetry results were suggestive of an obstruction in about 63% of the study population (**Table 3**). This result gave an indication of surgery. This is analogous to other studies found in the literature [2] [3] [17].

The most effective way to use uroflowmetry as a tool to evaluate the quality of micturition is to perform it pre-operatively in all patients diagnosed with a urethral stricture and then post-anastomotic urethroplasty at 3 months [7]. In our study, pre and post-operative uroflowmetry were done.

Post-operative uroflowmetry showed an excellent maximum flow rate (>15 ml/sec) in about 82% and a good flow rate in about 15% of the study population (**Figure 9**) with about 97% patient satisfaction. This is in accordance with several studies in literature [18] [19] [20]. In addition to factors such the site, number and length of the urethral strictures, we could attribute this high success rate to the fact that our surgeons respected the rule of the golden triad intraoperatively which consists of complete excision of the scarred tissue, lateral fixation of healthy urethral end mucosa and the creation of a tension-free anastomosis.

However, our findings do not align with that of Bradley et al who noticed that

in order to ascertain that the uroflowmetry is an adequate screening tool to evaluate the quality of micturition after urethral reconstruction surgery, it should be combined with urinary symptom score evaluation. Also, Bradley and colleagues argued that the median age of repair which was 42 years (range 19 - 85) which is similar to our finding further complicates the uroflowmetry data. This is because, a large percentage of these men may have had a component of benign prostatic hyperplasia which is a confounding variable making it difficult to use uroflowmetry as a screening measure [21].

Re-stricture is considered when the patient at follow-up presents with lower urinary tract symptoms and urine flow rate of <10 ml/sec. In our study, 3% of the study population had a recurrence of urethral stricture post anastomotic urethroplasty. Charles Azuwike and colleague in Nigeria had similar finding [3]. Possible explanations for re-stricture are poor accessibility, inadequate excision of the fibrose tissue and inadequate mobilization of the distal bulbar segment resulting in anastomotic tension.

Minor post-operative complications noted in this study were urinary tract infections, wound infection, urethra-cutaneous fistulae which were successfully treated.

Nevertheless, our study comes with a few limitations. Firstly, our study sample was small and secondly, the retrospective study design comes with recall bias. These limitations skewed some of our findings. More cross-sectional and prospective studies using RUG/VCUG with larger sample sizes should be carried out in the future in which all the diagnostic, and evaluation aspects will be evaluated. However, despite these limitations, the study provides data that can help healthcare providers in evaluating the quality of micturition after anastomotic urethroplasty in the context of limited resources.

5. Conclusion

Anastomotic urethroplasty is the gold standard for the treatment of short urethral strictures. The results are good in the immediate and long term post-operative period with low re-stricture rates and minimal complications. The use of the uroflowmetry as a screening tool for evaluating the quality of micturition after urethroplasty is effective.

Authors' Contribution

All the authors contributed to the research work. They read and agreed to the final version of the manuscript.

Conflicts of Interest

The authors declare no competing financial or personal interests.

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