Cohort Study

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Short-term recurrence rate of male urethral stricture and its predictors after treatment with optical internal urethrotomy: Prospective Cohort Study at a tertiary center in Ethiopia

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Abstract

Background: Although optical internal urethrotomy is popular among the urologists due to its simplicity and safety, urethroplasty is considered the gold standard treatment for urethral strictures. This study aims to determine the 1-year recurrence rate of urethral strictures after optical urethrotomy and identify predictors of recurrence in a tertiary center in Ethiopia.

Methods: A prospective observational cohort study was conducted on 80 male patients who underwent optical urethrotomy from November 2019 to August 2020 in a tertiary center in Ethiopia. Logistic regression was used to analyze the association between dependent and independent variables, with a *P*-value of <0.05 considered statistically significant.

Results: The mean and median age (±SD) of patients at the time of the procedure were 54.76 (±14.74) and 58 years with a range [20–78], respectively. Urethral discharge was the most common etiology identified in 39 (48.75%) of patients. Eleven (13.75%) patients had no identifiable etiology for their urethral stricture disease. The majority of patients presented with at least one voiding lower urinary tract symptoms. Sixty-eight (85%) patients out of the total had a single stricture and 12 (15%) had multiple strictures. The location of the stricture was in the bulbar urethra on cystourethrography in 83% of the patients. The 1-year recurrence rate of urethral stricture after optical urethrotomy was 35% in our study. The number of strictures and the presence of hypertension were independent predictors of recurrence of urethral stricture within 1-year after treatment with optical urethrotomy (AOR = 15.35, 95% CI: 2.92–80.61, *P* = 0.00; AOR = 19.47, 95% CI: 2.11–178.98, *P* = 0.01, respectively).

Conclusions: Our study identified that multiple strictures, and the presence of hypertension are associated with an increased recurrence rate in the first postoperative year.

Keywords: one year recurrence rate, optical internal urethrotomy, prospective analysis, urethral stricture

Introduction

Urethral stricture is defined as an abnormal narrowing of the anterior urethra, which is surrounded by the corpus spongiosum[1]. It is relatively common in men, with an incidence of 0.9%[2]. Stricture can result from various etiologies, including infectious, traumatic, idiopathic, and congenital causes[3].

In developed countries, iatrogenic injury is the leading cause of strictures, while infectious causes are more common in developing nations[4,5]. Idiopathic strictures is diagnosed when a specific etiologic factor is lacking. This accounts for 30% of urethral strictures. The mechanism entails minor trauma that occurred a long time ago in the past (e.g. microtraumas while riding a bicycle). Lichen sclerosis is a noninfectious inflammatory cause of urethral stricture. Its pathophysiology is poorly understood[4,6,7]. In developing nations the most common cause of urethral stricture is infectious or nonspecific urethritis. The infectious etiology can be gonococcal or chlamydial urethritis. A

HIGHLIGHTS

- The main aim of our study is to determine the 1-year recurrence rate of urethral stricture after treatment with optical urethrotomy and identify predicting factors of urethral stricture recurrence at a tertiary center in Ethiopia.
- The 1-year recurrence rate of urethral stricture after optical urethrotomy was 35% in our study.
- Number of strictures and presence of hypertension were independent predictors of recurrence of urethral stricture within 1-year after treatment with optical urethrotomy [AOR = 15.35(2.92–80.61) at 95% CI; *P* = 0.00] and [AOR = 19.47(2.11–178.98) at 95% CI; *P* = 0.01], respectively.

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study conducted on etiology with regard to stricture location depicts bulbar stricture resulted from infectious cause in more than 70% of cases and traumatic etiology was the culprit in all membranous strictures[8].

Urethral strictures are most common in the bulbar urethra, followed by penile and navicular fossa strictures. Posterior urethral stenoses are rare. They are caused by traumatic urethral distraction or following radiotherapy for prostate cancer[7,9].

Urethral stricture can be suspected based on the patients' history and clinical examination. However, the main stay of diagnosis for urethral stricture is Cystourethrography (retrograde and voiding).

Optical internal urethrotomy (OIU) and urethral dilatation are the two most frequently performed procedures for urethral strictures, worldwide. There is no difference in the efficacy of these two treatment options for urethral stricture disease. They may be used for the initial treatment of stricture disease with equal effect. Optical urethrotomy is an easy and reproducible procedure with minimal complications[10]. Strictures can be treated via repetitive endoscopic means, or by definitive reconstruction with urethroplasty, the latter being the preferred option. This procedure is associated with a higher risk (40%) of recurrence[11,12]. When a recurrence rate of more than 35% is likely, or after two previous OIU, urethroplasty should be offered as a first-line treatment. Urethroplasty is the gold standard management for urethral stricture[2,13]. The main objective of this research is to assess the 1-year recurrence rate of new anterior urethral stricture and to elucidate associated factors.

Methods

Registration and ethics: Research Square Registry number is stated, in accordance with the Declaration of Helsinki. Unique identifying number: rs.3.rs-2869677/v1, available at https: www.doi.org/10.21203/rs.3.rs-2869677/v1

This study was conducted on male patients who underwent optical urethrotomy for male urethral stricture from November 2019 to August 2020 G.C. in the urology unit of a tertiary hospital. An observational prospective cohort study design was used. One hundred twenty-four (124) male patients who underwent optical urethrotomy were screened and 80 of them were included in this study after fulfilling the inclusion criteria. Forty-four (44) patients were excluded from the study. Patients enrolled for the study were followed for 1-year after undergoing optical urethrotomy.

A data collection tool was designed by the investigators and pretested. Data was collected from September 2020 up to August 2021 G.C. Data was entered into Epi info7 and cleaned. Data was transferred to and analyzed using SPSS version 26. Since the sample size is sufficient, parametric data analysis was employed. All independent variables were analyzed using cross-tabulation. The level of statistical significance was set at a P-value <0.05. Variables which were significant were then analyzed using binary logistic regression. Finally, variables found with statistically significant association were taken as independent risk factors for the recurrence of urethral stricture.

Sociodemographic data (age), preoperative evaluation findings [etiology, location, and number of strictures on cystourethrography (CUG)], intraoperative assessment (complications) and recurrence rate of urethral stricture following optical urethrotomy were studied. The procedures were done by five urologists with similar experience. The technique they used involved a single cut of the stricture at the 12 o'clock position using a cold knife.

Patients were then followed for a duration of 12 months. Postprocedure follow-up included assessment of patients' symptoms and postoperative CUG when a recurrence of urethral stricture was suspected. Postoperative CUG was not uniformly done for all patients. The recurrence rate was assessed using one parameter: the need for repeat procedures due to recurrence of symptoms. The study has been reported in line with the Strengthening the Reporting of Cohort Studies in Surgery (STROCSS) criteria[14,15].

Inclusion criteria

(1) All adult male patients who underwent optical urethrotomy for the first time during the study period.

Exclusion criteria

(1) All patients with neurologic deficits, lost to follow-up, prior optical urethrotomies, patients with acute urinary retention, failed optical urethrotomies, and a concurrent diagnosis of benign prostatic hyperplasia.

Operational definitions

(1) Recurrent urethral stricture is need for repeat optical urethrotomy based on the presence of voiding urinary symptoms and urethral narrowing on postoperative CUG.
(2) Voiding urinary symptoms: voiding symptoms (poor stream, straining, sense of incomplete emptying) reported by the patient during follow-up.

Dependent variables

Recurrence rate of urethral stricture within 1-year after optical urethrotomy.

Independent variables

(1) Age of the patient in years.
(2) Etiology of stricture.
(3) Comorbidities: hypertension, renal disease, and cardiovascular disease.
(4) Location and number of strictures on CUG.

Ethical Consideration

The study was conducted after getting an ethical clearance letter with a reference number of PM/23/473 from the Institutional Review Board (IRB) of the hospital. The confidentiality of patients' data was kept throughout the study duration. We confirm that every procedure of this study was under the guidelines of the Declaration of Helsinki.

Results

Our demographic and preoperative clinical data showed that 124 male patients who underwent optical urethrotomy were screened and 80 of them were included in this study after fulfilling the inclusion criteria. Forty-four (44) patients were excluded from the

study. These consisted of patients with previous OIU (19), lost to follow-up (8), patients with benign prostatic hyperplasia (7), failed procedure (4), patients with acute urinary retention (3), and deceased patients (3).

The mean and the median age (±SD) of patients at the time of the procedure were 54.76 (±14.74) and 58 years with a range [20–78], respectively. The majority (41.25%) of patients were above the age of 61 years followed by the age range of 41–60 years, which accounted for around 36%. The majority of patients were from urban setting 54 (67.5%) and 26 (32.5%) came from rural setting. The etiology of the urethral stricture disease was assessed using patient history. Urethral Infection (discharge) was the most common etiology identified in 39 (48.75%) of patients followed by urinary tract instrumentation (iatrogenic) in 27 (33.75%), pelvic trauma in 1 (1.25%) patient, and horseback riding in 2 (2.5%). Eleven (13.75%) patients had no identifiable etiology for their urethral stricture disease. These patients had no history of urethral discharge or instrumentation.

The majority of patients (89%) presented with at least one voiding lower urinary tract symptoms. While 66% had more than one voiding symptoms. The rest of the patients presented with irritative and mixed symptoms. Patients with no symptoms during follow-up were considered not to have recurrent stricture disease.

Sixty-eight (85%) patients out of the total had a single stricture and 12 (15%) had multiple strictures. The location of the stricture was in the bulbar urethra on CUG in 83% of the patients (Fig. 1). Due to inconsistent reporting on preoperative CUG, the length of the stricture was not included. Sociodemographic and clinical data are described in Table 1.

With regard to the operative procedure, OIU was performed in all patients as an outpatient. The procedure was postponed in patients with urinary tract infections. These patients were operated on after successful treatment of their urinary infections. Patients were placed in the dorsal lithotomy position and the procedure was done under local anesthesia using a 21 Fr. Sachse urethrotome with a 0° telescope. Strictured segment was cut using a cold knife at the 12 o'clock position in all patients. The procedures were performed by five urologists with similar level of experience and who use similar techniques. Safe passage of the urethrotome into the bladder was considered a successful procedure. Endoscopic or urethrographic estimation of stricture length was not performed for all patients uniformly. All patients were put on oral antibiotics and catheterized for a duration of less than 1 week postoperatively. No patient had suffered major complications in the immediate postprocedure period. Patients were sent home after shortly after the procedure. In the follow-up period, patients were appointed to the urology referral clinic at 1 month, 3 months, 6 months, and 12 months postprocedure.

Twenty-eight (28) out of the 80 patients (35%) experienced recurrence of voiding urinary symptoms or evidence of narrowing on postoperative CUG within 1-year. Hence, all of them needed repeat optical urethrotomy. The mean and median time to recurrence of urethral stricture was 6.3 and 5.6 months, respectively. There was no a statistically significant association between the age, etiology, location of strictures, and overall recurrence of urethral stricture within 1-year after treatment with optical urethrotomy. There was statistically significant association between number of strictures, the presence of hypertension as a comorbidity, and the overall recurrence of urethral stricture within 1-year (AOR = 15.35, 95% CI: 2.92–80.61, $P = 0.00$; AOR = 19.47, 95% CI: 2.11–178.98, $P = 0.01$, respectively) (Table 2). The presence of comorbidities such as diabetes melitus, renal diseases, and cardiovascular diseases was not significantly

Table 1

Sociodemographic and preoperative clinical data.

Variable	Category	Frequency ($n = 80$)	%
Age groups	20–40 years	18	22.50
	41–60 years	29	36.20
	61–78 years	33	41.25
Etiology	Urethral infection	39	48.75
	Instrumentation	27	33.75
	Pelvic trauma	1	1.25
	Horseback riding	2	2.5
	Idiopathic	11	13.75
Comorbidity	DM	3	3.75
	HTN	8	10
	Renal disease	5	6.25
	CVS disease	3	3.75
	No comorbidity	61	76.25
Number of Stricture	Single	68	85
	Multiple	12	15

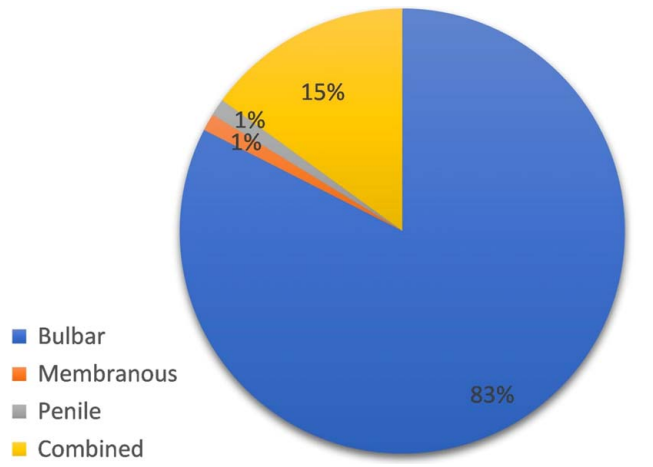

Figure 1. The location of the strictures based on preoperative CUG.

Table 2

Factors associated with recurrence of urethral stricture following optical internal urethrotomy.

	Recurrence				
Factors	Yes ($n = 28$)	No ($n = 52$)	*P*	COR (95% CI)	AOR (95% CI)
Number of strictures					
Multiple	10	2	< 0.05	13.89 (2.77–69.55)	5.35 (2.92–80.61)
Single	18	50		1	1
Comorbidities					
Hypertension					
Yes	7	1	0.01	17.00 (1.96–146.8)	19.47 (2.11–178.98)
No	21	51		1	1

COR, crude odds ratio; AOR, adjusted odds ratio.

associated with the recurrence of urethral stricture within 1-year after direct visual internal urethrotomy.

Discussion

OIU is a safe and relatively easy procedure, often preferred for its simplicity and good short-term results. However, urethroplasty remains the gold standard of treatment for complex or recurrent strictures[16]. Successful endoscopic treatment is defined as no need for further intervention or instrumentation[17,18].

In our current observation, the mean and median age of the patients were 54.76 and 58 years, respectively. The most common age group was those above the age of 61 years followed by the age range of 41–60 years. This is comparable to a study conducted in another tertiary center in the same country[18]. Urethral infection was the most common etiology accounting for 48.75% of patients[19]. There was no identifiable etiology in 13.75% of the patients in our study. This is in contrast to the data from global studies particularly in developed countries. The most common cause of urethral strictures is iatrogenic injury to the urethra[4,20,21].

The majority of patients presented with predominantly voiding lower urinary tract symptoms. While the rest of the patients presented with irritative and mixed symptoms. A study conducted in the USA also listed obstructive symptoms as the commonest presenting symptom of urethral stricture[22].

The location of the stricture was in the bulbar urethra on CUG in 83% of the patients. Similarly, in other studies, the most common location of urethral stricture was the bulbar urethra[7,9,23].

The main aim of our study was to assess the recurrence rate of urethral stricture and associated factors within 1-year after OIU. We demonstrated that patients with multiple strictures were more likely to have recurrence within 1-year after OIU as compared to patients with a single stricture year [AOR = 15.35(2.92–80.61) at 95% CI; $P = 0.00$]. Furthermore, patients with hypertension were also at increased risk for recurrence when compared with patients without hypertension [AOR = 19.47(2.11–178.98) at 95% CI; $P = 0.01$]. This is comparable to other studies done on the recurrence of urethral stricture after optical urethrotomy[15,24–26]. The mean and median time to recurrence of urethral stricture was 6.3 and 5.6 months, respectively. These findings are similar to a study done in South Africa which found a recurrence rate and median time to recurrence of 40% and 6 months, respectively.[27] There was no statistically significant association between age, etiology location of strictures and overall recurrence of urethral stricture within one year after treatment with optical urethrotomy.

Nonetheless, the limitations of this study include the study being conducted in a single center, which makes generalization to a national level troublesome. Furthermore, only the need for recurrent optical urethrotomy was used as an outcome measure without objective urodynamic studies. Since the length of strictures was not uniformly assessed in our study, we did not use a standardized urethral stricture assessment such as the Urethral Stricture Score (UREThRAL). In addition, the sample size was smaller, the duration of follow-up is shorter and there was a profound effect exerted on our study due to the COVID-19 pandemic during the study.

Conclusions

The recurrence rate of optical urethrotomy is associated with patient and stricture related factors. These include patient factors (smoking, previous treatment, and comorbidities) and stricture factors (length, location, number, and etiology). Multiple strictures and the presence of hypertension are linked to increased recurrence rates. Age, other comorbidities, etiology, and stricture location and length are not independent predictors of recurrence.

Ethical approval

The study was conducted after getting ethical clearance letter with reference number of PM/23/473 from the Institutional Review Board (IRB) of Saint Paul's Hospital Millennium Medical College.

Consent

Consent was obtained from the study participants.

Sources of funding

This study was funded by research directorate of Saint Pauls' Hospital Millennium Medical College. The institution had no other involvement apart from funding this study.

Author contribution

F.H.I., A.T.T., H.T., S.M.H., F.O.M., K.H.G.: were involved on study concept, data collection, analysis, and writing and approving the final manuscript.

Conflicts of interest disclosure

All the authors declared that they have no competing interests.

Research registration unique identifying number (UIN)

Research Square Research Registry number is stated, in accordance with the Declaration of Helsinki. Unique identifying number: rs.3.rs-2869677/v1], available at https: www.doi.org/10.21203/rs.3.rs-2869677/v1]

Guarantor

Dr Feysel Hassen Issack is the guarantor of this project.

Provenance and peer review

Not commissioned, externally peer reviewed.

Data availability statement

The datasets used and analyzed during this study are available from the corresponding author if needed.

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