

Author's Affiliation:

¹Assistant Professor, Department of Urology,
²Post Graduate Student, Department of General
Surgery, Mysore Medical College & Research
Institute, Mysuru, Karnataka 570001, India.

Corresponding Author:

Prasad HL, Assistant Professor, Department of
Urology, Mysore Medical College and Research
Institute, Mysuru, Karnataka 570001, India.

E-mail: prasadhl@gmail.com

The Cause, Modes of Presentation, Investigations and Initial Management Procedures in Urethral Stricture Disease

Prasad HL¹, Nagamallesh CS²

Abstract

Background: Stricture and fibrosis is the result of wound healing by chronic inflammation resulting in the formation of scar. Stricture Urethra patients have varied clinical presentations from Irritative to Voiding lower urinary tract symptoms (LUTS). The present study was undertaken to record the investigations and initial management of urethral stricture disease. *Materials and Methods:* It is a non - randomized prospective study conducted in 50 Men with a diagnosis of Urethral stricture disease, who underwent Urethroplasty (n=25), VIU (n=25). Pre-operative symptom assessment and investigations were done and treatment outcomes such as Subjective assessment, Objective tests and complications were studied. *Statistical Analysis:* Chi square test, Cramer's V test, Repeated Measures ANOVA was the tests used for statistical analysis of data using SPSS software. *Result & Discussion:* The most common cause of urethral stricture is external trauma (32%) and in Group 2, most common cause is Iatrogenic (48%). This did not show any statistically significant (p=0.591) difference when Cramer's V test for symmetric measures was performed (p=0.505 and p=0.591 respectively). VIU as a treatment option for patients with short-segment bulbar strictures has a success rate of ~ 60%, with the remaining requiring a secondary procedure within 6 months.

Keywords: Urethral stricture disease; Visual Internal urethrotomy; Balanitis Xerotica Obliterans; Membranous Urethral Stricture; Buccal Mucosa Graft Urethroplasty.

Introduction

Urethral stricture affects approximately 300 in 100000 men [1]. The process of wound healing by chronic inflammation results in the formation of granulation tissue, ultimately leading to scar formation. This applies to inflammation of the urethra as well, resulting in subsequent scarring and stricture formation [2]. Gonococcal urethritis was initially the most common etiological factor for urethral stricture disease (USD), and has been now replaced by trauma or iatrogenic injury as the major etiology. Lichen sclerosus et atrophicus has been regarded as a major contributory factor towards the pathophysiology of urethral strictures [3].

Clinical presentation of Urethral stricture disease (USD) depends on the degree of obstruction to urinary flow, the location, degree and chronicity of the stricture. Patients may present with obstructive lower urinary tract symptoms (LUTS) or with

complications such as urinary tract infections (UTI), prostatitis or epididymo-orchitis, renal failure.

Diagnostic evaluation of patients with USD includes Uroflowmetry and imaging of the urethra. Urethral imaging is conventionally done with a retrograde urethrogram (RGU), which delineates the length and location of the stricture. However, recent advances in radiological imaging have contributed to the use of sono-urethrogram and urethral MRI.

Urethral stricture disease (USD) management has witnessed many changes right from the use of sounds and bougies [4,5], urethral dilatations, endoscopic procedures and open surgeries. Urethral stricture disease dates back to time immemorial with references to the problem and treatment by urethral dilatation appearing in the writing of ancient Indians, Greeks, Egyptians etc. In ancient India, Sushruta described use of a reed catheter lubricated with ghee. In Greece, Socrates

was known to joke about the gleet of others and poor Epicurus committed suicide when he could no longer dilate his own stricture. Treatment of strictures were essentially by means of intermittent bouginage in early years. Bougies were made of either wax, catgut or silver [6]. The pathology was however not realized until use of microscope to examine human tissues began. Inflammation from any cause was found to lead to granulation tissue formation followed by scarring which led to a stricture in a hollow organ such as urethra. Gonorrhoea to the ancient was hardly more than a common cold in an awkward place [6]. Despite the use of internal urethrotomy of Maisonneuve and Otis in 18th century there was still no cure for urethral strictures.

Turner-Warwick modified Johanson method by use of scrotal skin in 1960 [7]. The use of internal urethrotomy was revolutionized with the availability of a new endoscopic optical system devised by Harold Hopkins. The system provided a brilliantly clear view of the inside of the urethra [7]. Sachse (1974) introduced a new optical urethrotome which was elegant, easy and safe. Its initial results were so gratifying that the number of urethroplasties being performed in most centres fell dramatically [8].

Visual Internal urethrotomy (VIU) was popularized by Sachse in 1973 [9], with varied results. It was associated with a high rate of recurrence, and often necessitated repeated self-dilatations by the patients. This gave rise to the techniques of urethroplasty. Initial efforts were directed at excision of the stricture segment, followed by an end-end anastomosis. However, for long segment strictures, this technique was not feasible. Augmented and substitution urethroplasty techniques [10,11], either in single stage or as two stage procedures were then tried to repair long segment strictures involving the penile and bulbar urethra. Multiple studies have compared the various modalities used for management [12,13]. In the present study, we define the demographic features of patients with urethral strictures, causes, modes of presentation and investigations carried out for diagnosis of urethral strictures and to determine the results of the initial management procedures performed.

Materials and Methods

It is a non - randomized prospective study conducted in 50 Men with a diagnosis of Urethral stricture disease, who underwent Urethroplasty

(n=25), VIU (n=25). Data was collected by meticulous history taking, careful examination, and appropriate radiological and haematological investigations and collection of post-operative data with respect to post-operative uroflowmetry findings from the patients presenting to K.R. Hospital, Mysore and diagnosed with Urethral stricture from November 2016 to May 2018.

Males with age more than 18 years, with a diagnosis of primary or recurrent urethral stricture were included in the study. Male with less than 18 years of age, patients with coexistent benign prostatic hyperplasia, with coexistent neurogenic bladder were excluded.

Pre-operative imaging included a mandatory retrograde urethrogram in all patients. Patients were divided into two groups. with longer strictures planned for urethroplasty (Group 1: mean stricture length 3.7 cms) and shorter strictures planned for VIU (Group 2: mean stricture length 1.3 cms). Symptomatic assessment and Uroflowmetry at 1, 3 and 6 months after catheter removal and any failures were noted. A need for any secondary intervention, including dilatation, within a period of 6 months following the primary treatment modality was considered a failure.

Statistical Analysis: All data was entered into a Data Collection Proforma Sheet. Chi square test, Cramer's V test, Repeated Measures ANOVA was the tests used for statistical analysis of data using SPSS software.

Results

The age of the patients ranged from 14 years to 65 years with a mean age of 42 years. The incidence is highest in the 31-40 year age group with 30% of all the patients followed closely by 51-60 years age group with 22% (Table 1). Iatrogenic injury was the commonest cause of urethral stricture (38%). External trauma accounted for 13 patients (26%), inflammatory cause was in 12% and in 24% of patients, the causes were unknown (Fig. 1).

Table 1: Frequency of patients belongs to different age group.

Age in years	Frequency	Percent
11-20 y	4	8.0
21-30 y	8	16.0
31-40 y	15	30.0
41-50 y	8	16.0
51-60 y	11	22.0
61-70 y	4	8.0
Total	50	100.0

The commonest presentation is poor stream of urine which occurred in 76% of the patients followed by acute urine retention in 22%. Some of the patients had more than one presenting complaints. 6% of patients showed burning micturition, nocturia by 12%, acute urine retention was seen in 12% of patients and Balanitis Xerotica Obliterans (BXO) was not observed in any of the patients (Table 2).

Figure 2 shows the commonest investigation done for all patients is Retrograde Urethrogram (RGU), in which 54% of patients had Bulbar Urethral Stricture (BUS) followed by Penile Urethral Stricture (PUS) in 38% of patients. 2% of patients showed Membranous Urethral Stricture (MUS) and only 1% of patients showed Pan Posterior Urethral

Stricture (PPUS) and Pan Anterior Urethral Stricture (PAUS). For all 50 patient's urine routine has been done. Out of 50 patients 11 patients (22%) having significant pus cells in urine and remaining all the patients were found to be normal (Fig. 3).

In this study 25 patients (50%) having urethral stricture size <2 cm undergone Visual Internal Urethrotomy (VIU). Remaining 25 patients having urethral stricture size >2 cm undergone urethroplasty. Out of these 19 patients (38%) undergone anastomotic urethroplasty, 5 patients (10%) undergone Buccal Mucosa Graft Urethroplasty (BMGU) and 1 patient (2%) undergone staged Buccal Mucosa Graft Urethroplasty (Figure 4).

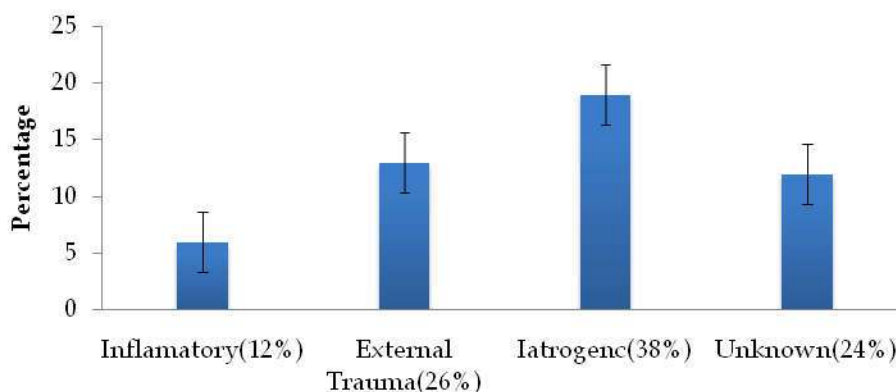


Fig. 1: Percentage of patients depending on the causes for urethral stricture

Table 2: Frequency of patients depending on their clinical presentation

Clinical Presentation	Number of patients
Poor Flow	38
Straining to Void	22
Burning Micturition	6
Nocturia	12
Frequency	34
BXO changes	0
Acute Urine Retention	12

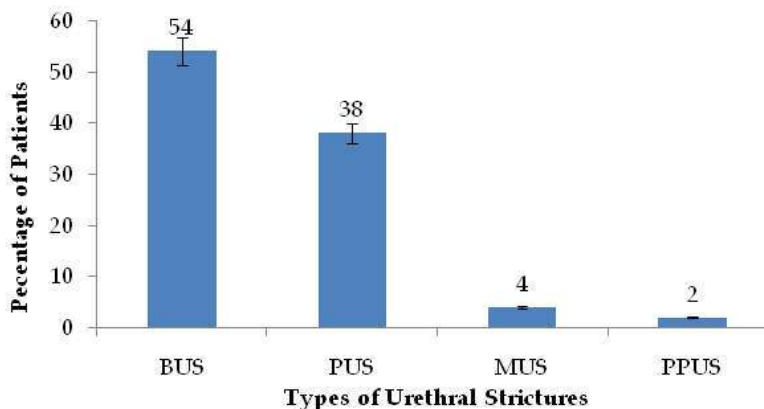


Fig. 2: Percentage of patients based on clinical investigations

In Group 1 the most common cause of urethral stricture is external trauma (32%) and in Group 2, most common cause is Iatrogenic (48%). This did not show any statistically significant ($p=0.505$) difference when Cramer's V test for symmetric measures was performed (Table 3). In both Group 1 and Group 2 most common site of urethral stricture is Bulbar urethra, 60% and 48% respectively. This

did not show any statistically significant ($p=0.591$) difference when Cramer's V test for symmetric measures was performed (Table 4). In Group 1 significant pus cells was noted in urine microscopy in 12% of patients where as in Group 2 was 32%. This also did not show any statistically significant ($p=0.088$) difference when Cramer's V test for symmetric measures was performed (Table 5).

Table 3: Descriptive statistics showing the comparison between the different groups against cause of urethral stricture.

Cause			Group		Total
			G1	G2	
Inflammatory	Count		3	3	6
	% within Group		12.0%	12.0%	12.0%
External Trauma	Count		8	5	13
	% within Group		32.0%	20.0%	26.0%
Iatrogenic	Count		7	12	19
	% within Group		28.0%	48.0%	38.0%
Unknown	Count		7	5	12
	% within Group		28.0%	20.0%	24.0%
Total	Count		25	25	50
	% within Group		100.0%	100.0%	100.0%

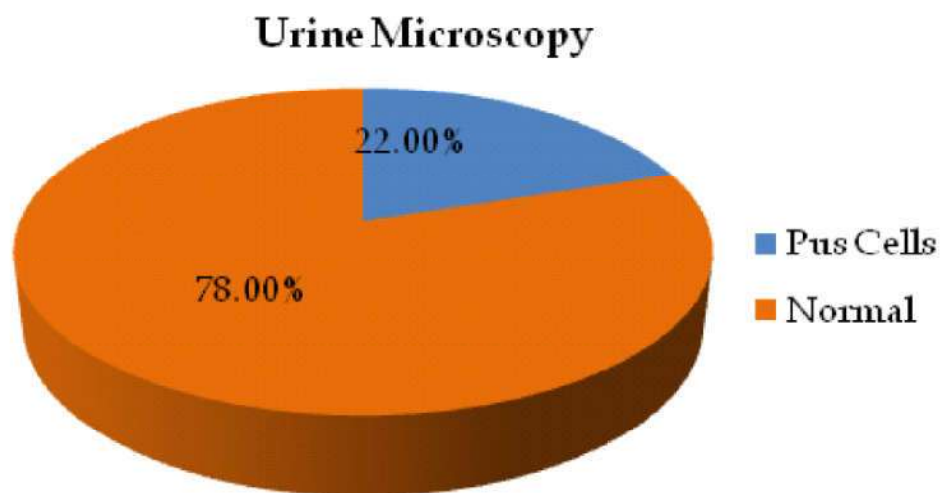


Fig. 3: Microscopic examination of Urine.

Table 4: Descriptive statistics showing the comparison between the different groups against site of urethral stricture

Site of Urethral stricture based on RGU		Group		Total
		G1	G2	
Bulbar Urethral Stricture	Count	15	12	27
	% within Group	60.0%	48.0%	54.0%
Penile Urethral Stricture	Count	8	11	19
	% within Group	32.0%	44.0%	38.0%
Membranous Urethral Stricture	Count	1	1	2
	% within Group	4.0%	4.0%	4.0%
Panposterior Urethral Stricture	Count	0	1	1
	% within Group	0.0%	4.0%	2.0%
Pananterior Urethral Stricture	Count	1	0	1
	% within Group	4.0%	0.0%	2.0%
Total	Count	25	25	50
	% within Group	100.0%	100.0%	100.0%

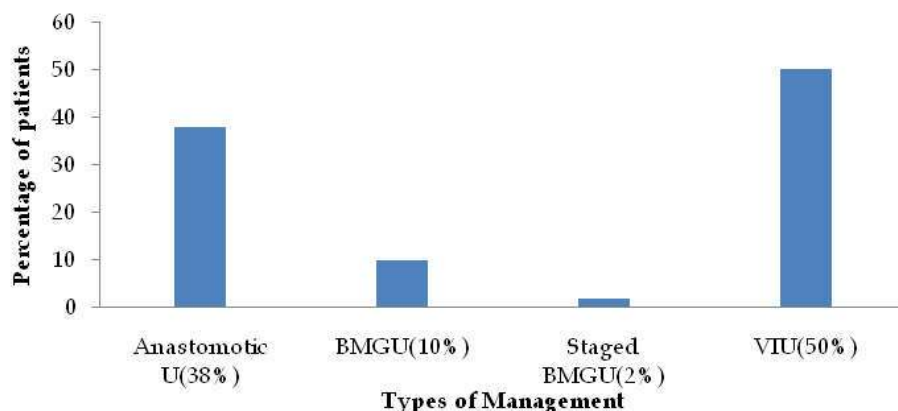


Fig. 4: Types of primary management of urethral stricture

Table 5: Descriptive statistics showing the comparison between the different groups against urine microscopy

		Group		Total	
		G1	G2		
Urine routine examination	PUS	Count	3	8	11
		% within Group	12.0%	32.0%	22.0%
	N	Count	22	17	39
		% within Group	88.0%	68.0%	78.0%
Total		Count	25	25	50
		% within Group	100.0%	100.0%	100.0%

Discussion

The management of strictures was based on stricture length and location as assessed by RGU and cystoscopy. In Group 1, 19 patients underwent anastomotic urethroplasty except and 6 patients underwent BMGU. Group 2 had patients who underwent VIU for short segment strictures involving the bulbar or peno-bulbar urethra. Clinical outcome was considered a failure when the criteria as previously described were met. Secondary interventions were undertaken to deal with the failures.

Although short-term results with the present study reflect a very high success rate favoring BMG substitution urethroplasty, a larger cohort and a longer follow-up may be required for a better assessment of this modality for management of USD.

The short comings of the study are short term follow up and small cohort. It is to be understood that VIU and Urethroplasty are entirely different procedures and cannot be vis a vis. A randomized comparison between holmium lasers VIU versus cold knife VIU may be a future direction along with randomized comparison of VIU in small and medium sized strictures of urethra. VIU as a treatment option for patients with short-segment strictures has a success rate of ~ 60%, with the

remaining requiring a secondary procedure within 6 months. Buccal Mucosal Graft Substitution Urethroplasty is a management modality with a high success rate (100%), with limited morbidity and low recurrence in the short-term follow-up.

A severe degree of urethral stricture causes changes typical of obstruction. They include the dilatation of proximal urethra. The musculature of the urinary bladder also hypertrophies to overcome the obstruction. These leads to trabeculations, sacculations and even diverticula. Hydro-uretero-nephrosis secondary to hypertrophy of uretero-trigonal complex and vesicoureteral reflux occurs. These can lead to renal insufficiency [14]. Because of stasis infection occurs which may cause periurethral abscess, prostatitis, cystitis and pyelonephritis which leads to pain.

Acute retention of urine is precipitated by oedema mainly due to urethritis, alcoholic excess and by voluntary retention. In other cases, the narrowness of the stricture results in increasing inability to expel residual urine and acute on chronic retention or retention with overflow supervenes [14]. If a bacterium in the urine splits urea, calculi may form. Stasis per se is also a predisposing factor to calculi formation [15].

Symptoms of the urethral stricture appears after the urethral calibre is reduced to less than 10 FG. It includes difficulty in voiding, chronic retention

with dribbling of urine. Acute retention of urine may occur especially after secondary infection due to residual urine. Attimes the stricture is palpable as a thickening of the urethra [15]. Complications may also lead to varying symptoms. Residual volume may give rise tourinary tract infection and epididymitis. Obstructed ejaculation may lead to infertility. Extravasation of urine each time patient passes urine worsens the spongio-fibrosis whichcan contract longitudinally resulting to a chordee during erection. Abscesses in distended paraurethral glands (paraurethral abscess) may burst in skin resulting into urethra-cutaneous fistulae. Calculi commonly form inside these abscesses and in the infected tissues. Infected urine forced into prostatic ducts due to high pressure results in prostatitis. Squamous cell carcinoma after urothelial metaplasia arises in approximately 1% of patients with longstanding urethral stricture [15].

Hernia, haemorrhoids and rectal prolapse may result due to straining. Septicaemia after urethral instrumentation and extravasation of urine can also occur. Backpressure leads tovesicoureteral reflux with subsequent features of obstructive uropathy. Urethral diverticula also occur after the urinary bladder musculature hypertrophies [14].

Conclusion

Urethral Stricture Disease is a disease affecting middle-aged men. Visual Internal urethrotomy as a treatment option for patients with short-segment bulbar strictures has a success rate of ~ 60%, with the remaining requiring a secondary procedure within 6 months. However, randomized studies and longer follow-up protocols are required to recommend one modality over the other.

References

1. Jackson MJ, Sciberras J, Mangera A, Brett A, Watkin N, N' Dow JM, Chapple CR, Andrich DE, Pickard RS, Mundy AR. Defining a patient-reported outcome measure for urethral stricture surgery. *European urology*. 2011 Jul 1;60(1):60-8.
2. Blandy JP. Urethral stricture. *Postgrad Med J*. 1980 Jun 1;56(656):383-418.
3. Barbagli G, Palminteri E, Balò S, Vallasciani S, Mearini E, Costantini E, Mearini L, Zucchi A, Vivacqua C, Porena M. Lichen sclerosus of the male genitalia and urethral stricture diseases. *Urologia internationalis*. 2004;73(1):1-5.
4. Harriss DR, Beckingham IJ, Lemberger RJ, Lawrence WT. Long-term results of intermittent low-friction self-catheterization in patients with recurrent urethral strictures. *British journal of urology*. 1994 Dec;74(6):790-2.
5. Lytton B. Perspectives of Urology: Official AUA History of Urology, 1976;1:119-B4.
6. Attwater HL. The history of urethral stricture B.J. *Urol*. 1943;15:31.
7. Koraitim MM. Posttraumatic posterior urethral strictures in children: a 20 year experience. *The Journal of urology*. 1997 Feb 1;157(2):641-5.
8. JP Blandy, P Chilton, JR Shah. The impact of optical urethrotomy on the management of urethral strictures B.J.Urol. 1983;55:705-710.
9. Sachse H. Die transurethrale scharfe Schlitzung der Harnrohrenstriktur mit einem Sichturethrotom. *Verhandl Deutsches Gesell Urol*. 1973;25:143-6.
10. Santucci RA, Mario LA, c Aninch JW. Anastomotic urethroplasty for bulbar urethral stricture: analysis of 168 patients. *The Journal of urology*. 2002 Apr 1;167(4):1715-9.
11. Barbagli G, Guazzoni G, Lazzeri M. One-stage bulbar urethroplasty: Retrospective outcome analysis in a series of 375 patients. *The Journal of Urology*. 2008 Apr 1;179(4):261.
12. Heyns CF, Steenkamp JW, De Kock ML, Whitaker P. Treatment of male urethral strictures: is repeated dilation or internal urethrotomy useful? *The Journal of urology*. 1998 Aug 1;160(2):356-8.
13. Steenkamp JW, Heyns CF, De Kock ML. Internal urethrotomy versus dilation as treatment for male urethral strictures: a prospective, randomized comparison. *The Journal of urology*. 1997 Jan 1;157(1):98-101.
14. Bailey and Love. Urethral strictures. *Short Practice of Surgery* 27th Ed. London: Chapman and Hall, 2000.pp.1261-1264.
15. John Blandy. Urethral strictures. *Lecture Notes on Urology* 4th edition. Oxford: Blackwell 1991.p.261.