

Clinical Profile, Management and Treatment Outcome in Urethral Stricture Disease in Male Patients at a Tertiary Care Center

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Abstract

Background: A urethral stricture in the male patients is a common and challenging problem to the urologist, and the search is still on for a satisfactory answer to this complex problem. The treatment depends on the etiology, nature, site, and extent of the stricture.

Aims and Objectives: To study the etiology, clinical presentation, treatment and early treatment outcomes of urethral strictures among patients seeking urological services at MGM Medical College and Hospital, Navi Mumbai.

Materials and Methods: After approval from Ethical Committee, a prospective cohort study of 75 patients was done, over a period of 3-year from August 2012 to August 2015, who were suspected clinically to have urethral stricture and proved on investigations (uroflowmetry, ascending urethrogram and retrograde urethrography, ultrasonography, magnetic resonance imaging, etc.). These patients underwent different modes of treatment.

Results: In this study, a significant association of length with etiology of stricture was observed ($P < 0.001$), on applying *post-hoc* test. Etiological factor for long length stricture was balanitis xerotica obliterans (BXO). Bulbar urethra is the most common site found for both idiopathic as well iatrogenic etiological factors. Overall, success rate of our study was 82.67%. Among all definitive treatment modalities, high success rate was associated with Anastomotic urethroplasty (87.50%) and buccal mucosa urethroplasty (86.50%).

Conclusion: Due to fast life with increasing road traffic accidents and with the advent of newer technological advances, pendulum of etiological factor has shifted from infective to iatrogenic and traumatic etiology. The most common cause of penile urethral stricture is BXO. Buccal mucosa graft urethroplasty is the most versatile surgical option which can treat stricture of almost all aetiologies and length with better success rates.

Key words: Balanitis xerotica obliterans, Buccal mucosa urethroplasty, Stricture urethra

INTRODUCTION

The urethral stricture is a narrowing of the anterior urethra caused by scarring of the urethral epithelium and the spongy erectile tissue of corpus spongiosum. The main causes of urethral stricture in India are trauma, iatrogenic,

and inflammation.¹ The traumatic strictures are becoming increasingly important due to increase in civil violence and injury following road traffic accidents. Lichen sclerosus balanitis xerotica obliterans (BXO) usually begins with inflammation of the glans and foreskin and inevitably causes meatal stenosis, if not a true stricture of the fossa navicularis. Urethral dilation is the oldest and simplest treatment of urethral stricture disease for the patient with an epithelial stricture without spongiofibrosis who are not willing to undergo a reconstructive procedure and/or not fit for anesthesia. Direct visual internal urethrotomy (DVIU) is best utilized for short superficial strictures <1.5 cm that involves the bulbar urethra or in post-urethroplasty failure cases. Anastomotic urethroplasty is

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considered the gold standard for the short strictures as it has the best long-term results, longer strictures are best managed with substitution urethroplasty. Buccal mucosa graft (BMG) has emerged as a reliable urethral substitute with long-term results comparable or superior to penile flaps.² BMG is easy to harvest and trim, more resistant to infection than skin, flexible and has thick lamina propria and excellent microvasculature favorable for graft imbibition and inosculation. The natural location of BMG in oral wet environment favors easy adaptability in the urethral passage, thus giving long-term results.

Aims and Objectives

Aim

To study the etiology, clinical presentation, treatment, and early treatment outcomes of urethral strictures among patients seeking urological services at MGM Medical College and Hospital, Navi Mumbai.

Objectives

To study the frequency of urethral strictures at various sites in the urethra.

To compare early treatment outcomes in relation to the treatment given.

MATERIALS AND METHODS

After approval from Ethical Committee, a prospective cohort study of 75 patients was done, who were suspected clinically to have urethral stricture and proved on investigations (uroflowmetry, ascending urethrogram and retrograde urethrography, ultrasonography, magnetic resonance imaging (MRI), etc.). These patients underwent different modes of treatment. Study included:

1. Taking detailed history of patients including the history of any obstructive and irritative voiding symptoms, urinary retention, any instrumentation. If buccal mucosa urethroplasty (BMU) was planned and history of tobacco chewing was present than patient was advised to stop tobacco chewing and start oracep gargles
2. Detailed physical examination including the foreskin and meatus for changes of BXO and urethral induration, perineum for scar of previous surgery, suprapubic site for any suprapubic catheterization (SPC) scar, availability of foreskin and scrotal laxity if flap was required.
3. Investigations:
 - a. Urine routine and microscopy and culture for infection
 - b. Ultrasonography for pre- and post-voids residual urine, bladder thickness, and any back pressure changes due to long-standing bladder outlet obstruction

- c. Uroflowmetry to see Qmax, prolonged duration of maturation and flow pattern
- d. Ascending urethrogram and micturating cysturethrography to see site, length, depth of stricture and to see any associated complication like fistula, diverticulum, and false passage
- e. MRI if symptoms of complex stricture like failed urethroplasty and multiple fistula.
4. Routine investigation for fitness for surgery
5. If symptomatic UTI then control of infection
6. Management depending on site, length, depth and etiology of stricture and previous surgery
7. After urethroplasty, the patient was subjected to pericatheter urethrogram after 3rd-4th week postoperatively depending on the complexity of stricture.

Follow-up protocol: Patients were followed up in terms of history, physical examination and flow rate after 4 weeks, 3 months and 6 months postoperatively and urethrogram and cystoscopy at 4 weeks.

Failure was defined postoperatively if any one of the following seen:

1. Poor flow rate (Qmax <15 ml/s)
2. Abnormal urethrogram or urethroscopy and
3. Need for any intervention if patient symptomatic.

RESULTS

Most common location observed intraoperatively was bulbar in 42 (56%) cases, followed by penile in 13 (17.33%), bulbar+penile in 7 (9.33%), pan urethral in 11 (14.67%), penile+fossa navicularis in 2(2.67%) cases.

In the case of pan urethral stricture BXO being the most common etiology. Bulbar urethra is the most common site found for both idiopathic as well iatrogenic etiological factors.

Among all definitive treatment modalities, high success rate was associated with anastomotic urethroplasty (87.50%) and buccal mucosa urethroplasty (86.50%).

Buccal mucosa urethroplasty was associated with slightly higher complication rate as compared to other treatment modalities, e.g., penile edema, pericatheter pus discharge, and urinary tract infection.

DISCUSSION

In our study, mean age of patients was 42.03 ± 15.73 years (range 16-84 years). The most common age group was

21-30 years (24%) followed by 41-50 years (22.67%) and least were in extremes of age. In our study, the most common etiology was idiopathic in 29 (38.67%) patients. Next common etiological factor was iatrogenic in 20 (26.66%) patients (previous catheterization in 18.66% and previous instrumentation in 8% patients) followed by trauma in 13 (17.33%), BXO in 8 (10.67%) and infection in 5 (6.67%) patients. According to Rourke and Hickie³ etiology was idiopathic in 47.0%, iatrogenic in 19.6%, trauma in 12.1%, and in BXO in 14.2% cases. Fenton *et al.*⁴ also showed that nowadays most common etiology is idiopathic and iatrogenic. Infection was the least common cause of stricture in our study. Some decades ago, the most important cause of urethral stricture was infection, but with the effective and efficient control of infection, the incidence of stricture secondary to infection has significantly reduced however due to extensive transurethral surgery iatrogenic etiology is uprising. BXO caused stricture in 8 (10.67%) cases. Palminteri *et al.* demonstrated that BXO was a cause of stricture in 13.5% of cases.¹ Incidence of BXO is variable in literature as Barbagli *et al.*⁵ and Venn and Mundy⁶ have shown incidence 25% and 30%, respectively. Although the higher mean age (47.75 ± 17.28 years) was observed in iatrogenic strictures, followed by in BXO induced (46.25 ± 11.9 years) and lower age (29.00 ± 15.18 years) was observed in infective and traumatic strictures (37.31 ± 11.33 years) but no statistically significant difference was observed between age and the etiology.

Symptoms at presentation were LUTS in 56 (74.66%) patients (out of these 67.86% patients presented with only voiding symptoms, 32.14% patients presented with both voiding and storage symptoms), acute urinary retention in 13 (17.33%) patients, pain in perineal region in 6 (8%) patients, incontinence and SPC in situ 4 (5.33%) patients each, which is also similar to other studies^{3,7} mentioned in literature. No patient presented with only storage symptoms. In our study, 15 (20%) patients required emergency intervention in the form of suprapubic catheterization for acute urinary retention, multiple fistula or abscess.

In our study, 12 (16%) patients presented with abnormal findings on local examination. Most patients with abnormal findings showing signs of BXO (10.67%) with or without meatal stenosis, so genital and perineal examination is very important in the evaluation of urethral stricture patients. Apart from history and local examination uroflowmetry and urethrography (ascending and micturating [Figure 1]) was helpful in making the diagnosis of urethral stricture. Mean Q max was 7.38 ± 2.714 ml/s and most patients presented with the typical graph (extended urination time with a low-level plateau). The mean length of stricture on

urethrogram was 2.82 ± 2.344 cm. which was showing good correlation with intraoperative findings showing high sensitivity and specificity of ascending urethrogram as mentioned by El-Ghar *et al.* in literature.⁸

Most common location of stricture in our study was bulbar region (Table 1) in 42 (56%) patients which are similar to other studies,^{4,9,10} followed by penile strictures in 13 (17.33%) patients. Pan urethral stricture was present in 11 (14.67%) patients. There is statistically significant association noted between etiology and location of stricture. In bulbar region idiopathic and iatrogenic strictures were more common than other etiological factors (Table 2). In pan urethral strictures BXO was the most common etiology (54%), followed by iatrogenic (36%) and infection (9%) which shows that apart from BXO any instrumentation or catheterization can cause severe inflammation resulting into panurethral stricture. Palminteri *et al.*, demonstrated that LS is the most common cause of pan urethral stricture (48.6%).⁴ In our study, in the case of BXO patients pan urethral strictures (75%) was most common finding. Iatrogenic and idiopathic strictures were more common in bulbar region. Most trauma induced strictures (92.31%) were present in bulbar region.

In our study, mean length was 3.613 ± 3.0850 cm which is comparable to other studies.^{4,9,10} Among all patients,

Table 1: Distribution of the cases according to intraoperative location

Intraoperative location	Frequency (%)
Bulbar	42 (56)
Bulbar+penile	7 (9.33)
Penile	13 (17.33)
Penile+fossa navicularis	2 (2.67)
Panurethral	11 (14.67)
Total	75 (100)



Figure 1: Ascending urethrogram showing bulbar stricture

Table 2: Association of intraoperative location with the etiology of urethral stricture

Site	n (%)				
	BXO	Iatrogenic	Idiopathic	Infection	Trauma
Bulbar	0 (0.00)	10 (50.00)	19 (65.52)	1 (20.00)	12 (92.31)
Bulbar+penile	0 (0.00)	3 (15.00)	2 (6.90)	1 (20.00)	1 (7.69)
Panurethral stricture	6 (75.00)	4 (20.00)	0.00	1 (20.00)	0 (0.00)
Penile	2 (25.00)	3 (15.00)	6 (20.69)	2 (40.00)	0 (0.00)
Penile+fossa navicularis	0 (0.00)	0.00	2 (6.90)	0 (0.00)	0 (0.00)
Total	8 (100.00)	20 (100.00)	29 (100.00)	5 (100.00)	13 (100.00)

BXO: Balanitis xerotica obliterans

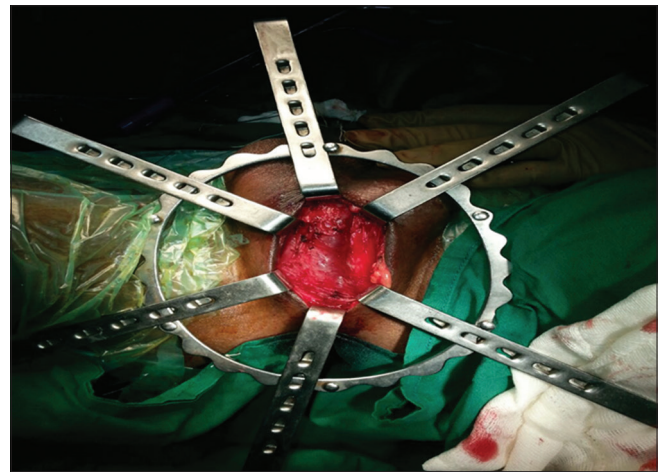
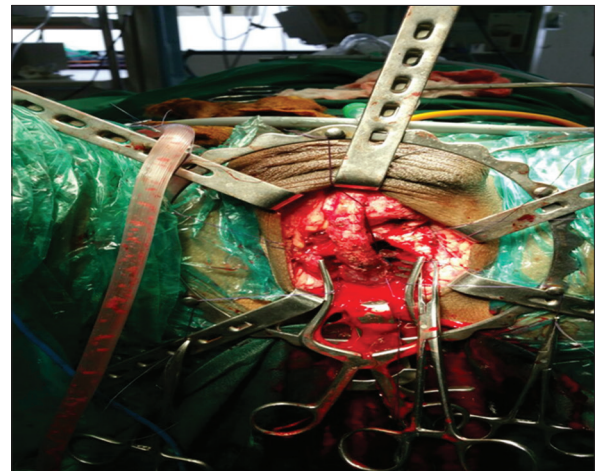
12 (16%) patients presented with stricture length >5 cm. Significant association of length with etiology of stricture was observed in our study ($P < 0.001$ S). BXO induced, iatrogenic and infective strictures had a more mean length (9.13 cm, 4.05 cm, 3.10 cm, respectively) as compared to others causes and this can be explained by inflammatory pathology being the basis of all these etiological factors.

Overall success rate in our study was 82.67%. The success rate for dilatation was 57.14% which is comparable to another study by Vicente *et al.*¹¹ with minimal complication so poor success rate shows that it is only palliative procedure not curative. For all recurrent cases again endoscopic dilatation was done as these patients were not fit for any definitive surgery. The success rate of DVIU in our study was 70% which is almost comparable to studies done by Jezior¹² and Wein *et al.*,¹³ but it is a short follow-up of only 6 months so chances of failure in long follow-up can be even high. All recurrent patients were advised BMU. Lauritzen *et al.*, demonstrated a significantly decreased stricture recurrence rate in the self-catheterization group (9%) versus the observation group (30%).¹⁴ In our study, there was no complication noted in intraoperative or immediate post-operative period after VIU.

Anastomotic urethroplasty (Figures 2 and 3) was done in 16 (21.33%) patients with success rate of 87.50% (Table 3). Other studies in literature also have similar success rate.^{2,15,16} Among 2 recurrent patients, 1 patient was treated with VIU and CIC and one was advised for BMU but he did not follow-up. In properly selected patients (bulbar stricture of <2 cm of non-inflammatory pathology) anastomotic urethroplasty has excellent results. In present study 5 (27.50%) patients developed complications in the immediate post-operative period. 3 (18.75%) patients developed urinary tract infection, 2 (12.50%) patients developed pericatheter pus discharge and 1 (6.25%) developed wound infection but all complication were well managed successfully (Table 4). Chances of failure are high in inflammatory stricture so inflammatory and long bulbar strictures should be treated by augmentation. In penile urethra due to lack of elasticity, it cannot be mobilized so excision of the urethra can cause shortening of

Table 3: Association of the success rate with different treatment modalities

Treatment modalities	Total	Success	Percentage
Anastomotic urethroplasty	16	14	87.50
Buccal mucosa urethroplasty	38	33	86.84
Endoscopic dilatation	7	4	57.14
Perineal urethrostomy	4	4	100
Visual Internal urethrotomy	10	7	70.00
Total	75	62	82.67

**Figure 2: Intraoperative view of initial incision and dissection in a case of excision with end to end anastomotic urethroplasty****Figure 3: Intraoperative view of urethra after anastomosis in anastomotic urethroplasty**

urethra leading to chordae so for penile urethral strictures augmentation urethroplasty is indicated irrespective of length and etiology of stricture.

In our study, the majority of patients (50.67%) were treated by augmentation urethroplasty with buccal mucosa (Figure 4). We did not use any local tissue flap for augmentation. In our study, 38 (50.67%) patients underwent buccal mucosa urethroplasty with success rate of 86.84% in short follow-up. Literature also suggests that BMU has success rate 84-96%.¹⁷⁻¹⁹ These variations noted in success rates between different studies could be due to variations in the duration of follow-up period. In this study, 5 (13.16%) patients developed recurrence. Among them, 1 patient developed urethrocutaneous fistula in the immediate post-operative period but he didn't turn up for further management. Redo BMU was done in 2 patients and VIU and CIC advised for rest of 2 patients. Pansadoro *et al.*,²⁰ and Barbagli and De Stefani²¹ have reported Stensen's duct damage, intraoperative bleeding, facial hematoma, infection, subjective local disturbances, neural damage, retraction from scar (lip/cheek distortion), and limited mouth opening. Slight oral discomfort was reported for only 2-3 days postoperatively by few patients. All patients were able to resume eating a regular diet on 2nd post-operative days, and none of the patients developed any major donor site morbidity. 20 (52%) patients developed minor post-operative complication which is slightly higher as compared to patients who underwent anastomotic urethroplasty group which is explained by complexity of the procedure. In our study, 35 patients underwent one-sided anterior dorsal onlay oral mucosa graft urethroplasty described by Kulkarni *et al.*²² while preserving the lateral vascular supply to the urethra, central tendon of the perineum, the bulbospongiosum muscle, and its perineal innervations so decreasing iatrogenic

impotence, ejaculatory problems, and postvoid dribble. In our study, 3 patients underwent ventral only for proximal bulbar strictures.

Eleven (14.67%) patients presented with pan urethral strictures and most of them are caused by inflammation either by BXO (54%) or iatrogenic cause (36%). We treated all patients in a single stage by Kulkarni's technique²³ using buccal mucosa with good results. Buccal mucosa from both cheeks can be used to gain additional length without adding any significant morbidity. Thus, it is clear that now the trends have moved toward using single-stage repair for difficult strictures of the anterior urethra due to BXO, and the substitute of choice is BM graft. The single-stage procedure is not appropriate for everyone, and poor patient selection can decrease success rates considerably. Two-stage repair is indicated for elderly, extensive involvement of glans and meatus by BXO and non-salvageable urethral plate. The current opinion is that the most prevalent graft for urethroplasty is probably the BM.

CONCLUSION

Irrespective of etiological factors bulbar urethra is the most common site to be get involved by stricture pathology. Before the advent of effective antibiotic treatment, infective etiology was the most common cause of stricture urethra. Due to fast life with increasing road traffic accidents and with the advent of newer technological advances, pendulum of etiological factor has shifted from infective to iatrogenic and traumatic etiology. The most common cause of pan urethral stricture is BXO. BMG urethroplasty is the most versatile surgical option which can treat stricture of almost all etiologies and length with better success rates.



Figure 4: After complete augmentation of the urethral plate by buccal mucosa graft

Table 4: Association of complication with different treatment modalities

Treatment modality	n (%)
Anastomotic urethroplasty (n=16)	
Pericatheter pus discharge	2 (12.5)
Urinary tract infection	3 (18.75)
Wound infection	1 (6.25)
Buccal mucosa urethroplasty (n=38)	
Fistula	1 (2.63)
Penile oedema	4 (10.53)
Pericatheter pus discharge	5 (13.16)
Urinary tract infection	6 (15.79)
Wound infection	4 (10.53)
Endoscopic dilatation (n=7)	
Penile oedema	1 (14.29)
Urinary tract infection	2 (28.57)
Perineal urethrostomy (n=4)	
Wound infection	1 (25)
Visual internal urethrotomy (n=10)	
Complication	0 (0)

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