

## Management of anterior urethral stricture

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**Abstract: Background:** The conventional method of repair of anterior urethral stricture with dilatation and Visual Internal Urethrotomy (VIU) resulted in high recurrence. Hence buccal mucosa is used for long term stricture free interval and is an effective measure of preventing stricture recurrence.

**Objectives:** 1) To determine the presentation, aetiology, age distribution and associated symptoms of anterior urethral stricture. 2) To assess and compare the outcome of various modalities of management of anterior urethral stricture. 3) To find out the impact of buccal mucosal urethroplasty on long term symptom free interval and stricture recurrence.

**Materials and Methods:** A prospective interventional study was carried out on 30 male patients, with anterior urethral stricture of varied aetiology, who were admitted in the Departments of Surgery and Urology, Kempegowda Institute of Medical Sciences and Research Centre, Bangalore, between June 2004 and June 2006. Procedure was carried for each patient depending on the site, nature and length of stricture.

**Results:** The study showed that patients undergoing buccal mucosal urethroplasty had long term symptom free interval and no post operative complications nor recurrence during the study period.

**Conclusion:** Though dilatation and VIU are used for palliative symptomatic relief in selected cases of anterior urethral stricture, buccal mucosal urethroplasty is the definitive treatment for anterior urethral stricture.

**Keywords:** Anterior urethral stricture, buccal mucosal urethroplasty, dilatation, meatoplasty, visual internal urethrotomy.

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### I. Introduction

Urethral stricture is the narrowing of the urethra, the tube through which urine exits the body. Urethral stricture may be caused by inflammation, scar tissue, a congenital abnormality or rarely a tumour. Urethral stricture blocks the flow of urine and slows the urine stream. In severe cases, it can cause dangerous urinary retention [1]. Chronic urinary retention can lead to urinary tract infections, bladder distension, incontinence and even kidney damage. If the stricture returns after two or more treatments, it is considered a recurrent stricture [2]. More cases of urethral stricture occur in men, because men have longer urethras that are more prone to damage. The term urethral stricture generally refers to the anterior urethra and is secondary to scarring in the spongy erectile tissue of the corpus spongiosum [1]. A posterior urethral stricture is due to a fibrotic process that narrows the bladder neck and usually results from a destruction injury, secondary to trauma or injury, such as radical prostatectomy [3].

Diagnosis of urethral stricture is made based on a suggestive history, findings on physical examination and radiographic or endoscopic evaluation [4]. Accurately documenting the extent and location of the stricture is important so that the most effective treatment options can be offered to the patient [1].

Treatment of urethral stricture usually aims to improve the flow rate of urine, ease the symptoms and to prevent possible complications [5]. Treatment of urethral strictures is based primarily on location, length and prior treatment. Also taken into consideration are patient preference and general medical condition [1]. Surgical treatment of urethral stricture disease includes one of the following procedures. Urethral dilatation is the oldest and simplest treatment advised for patients with an epithelial stricture without spongiofibrosis. It is not curative, but fractures the scar tissue of the stricture and temporarily enlarges the lumen. Visual internal urethrotomy (VIU) involves incising the stricture transurethrally using endoscopic equipment [6]. Meatoplasty is widening of the stricturous part of the external urethral meatus by raising the urethral flap and suturing it to glans penis. In urethroplasty, the stricturous area of the urethra is opened by urethrotomy and reconstructed using primary graft like penile skin, buccal mucosa or bladder epithelium.

Even though many techniques are available for the treatment of urethral stricture disease, each technique has its own advantage and disadvantage. Hence the present study was undertaken to assess the safety, efficacy and long term durability of various techniques in the surgical treatment of anterior urethral stricture.

### II. Subjects and Methods

A prospective study was carried out on thirty male patients with anterior urethral stricture of varied aetiology, who were admitted in the Departments of Surgery and Urology, during the period of June 2004 to June 2006, at Kempegowda Institute of Medical Sciences, Bangalore. Ethical clearance was obtained from the

Institutional Ethics Committee. After thorough explanation of the workup, informed consent was obtained from the patients and they were included in the study.

Preoperative assessment consisted of a detailed history to establish the cause of stricture and preoperative status of the individual with respect to continence and potency. Urinary stream was observed in each case, pre and post operatively. This was used as a major yardstick for determining the success of any modality of treatment, offered to the patient. External genitalia were examined and urethra palpated in all the patients. The upper urinary tract was assessed by ultrasound and in some cases by intravenous urography. Retrograde and voiding urethrography were performed to assess location, severity and length of stricture. Pre or per operative cystourethroscopy was carried out in all patients to assess the nature of stricture, presence of diverticulum, prostatic enlargement and back pressure effects.

Modality of treatment given was recorded. Urethral dilatation was a successful choice of treatment in 4 patients having soft, short, meatal or submeatal stricture. This was done at a number of sittings by introducing dilators under local analgesia until a size of 24 Fr. was achieved.

Visual internal urethrotomy (VIU) was carried out in 17 patients, who had undergone a total of 25 procedures. After prior urethroscopy, a well lubricated Sachse's urethrotome was introduced through the external meatus under general or spinal anaesthesia and was advanced under vision till the site of the stricture. The knife was gradually advanced into the bladder cutting through the full thickness of the stricture at 12'o clock position, avoiding blood vessels of urethra at 3 & 9' o clock position. The incision was extended in both directions until normal pink urothelium was seen. 16Fr. Foley's catheter was left indwelling for a period of 5-14 days, depending on the extent of stricture.

Meatoplasty was the treatment of choice in 4 cases of meatal stenosis. The stricture area was identified and a flap was outlined that would fit into the defect. The urethra was dissected out and opened back to an area of normal calibre. The lip of the flap was sewed to the incised urethra and was turned into the defect with interrupted sutures on each side. When the calibre of the urethra was adequate, the sutures were placed fixing the urethral flap to the epithelium of the glans.

Buccal mucosal urethroplasty was carried out in 12 patients. A Stein Hauser mucosal stretcher was used to stabilize the donor site i.e., the inner mucosal surface of the cheek. An area of 2.5 cms width and 5-7 cms length was measured and marked for graft retrieval ( Fig 1). A solution of lidocaine with epinephrine was injected along the lateral borders of the graft site, to enhance haemostasis. Taking care to avoid Stenson's duct, the buccal mucosal graft was harvested and defatted ( Fig 2). The donor site was closed with a running 4-0 chromic catgut suture. The microsurgical monotubularized graft was then tailored at each end and was sewn along each side to the intact dorsal roof strip of urethral mucosa at the stricture bed ( Fig 3, 4). The mucosal surface of the graft faced the urethral lumen. A 16 Fr silicone catheter, taped to the abdomen, was used for urinary drainage.

Post-operatively the patients were watched for nature of stream of urine, ease of micturition and also for any complications including recurrence. All patients were followed up at intervals of four weeks and progress was recorded for variable period of time.

### **III. Results**

The 30 male patients of stricture urethra treated with various modalities in the present study had a mean age of 35.5 years (age ranged between 21 & 50 years). The peak incidence was observed in the age group of 31-40 years, who constituted 43% of cases. When the symptoms were analysed, it was observed that 30% of the patients presented with obstructive and bladder symptoms whereas, 21% of them presented with acute retention. 24% of the patients had only obstructive symptoms whereas, 13% of them had only bladder symptoms.

When the etiology was analysed, most common causative factor was found to be iatrogenic, seen in 43% of patients. In 26% of these cases, it was catheter induced, whereas in 17% of cases, it was post instrumentation. The second common causative factor was found to be inflammation, as observed in 37% of cases, out of which, 27% of cases had non-specific urethritis. Etiology could not be determined in 20% of the cases (Table 1). When causative organism of UTI was analysed by doing culture and sensitivity in 13 cases, who showed evidence of infection in routine urine examination, E. coli was observed in 38% of cases whereas Klebsiella was noted in 23% of cases.

When the location of strictures based on urethrographic and cystourethroscopic findings were analysed, the commonest site of stricture was found to be at bulbar urethra, constituting 50% of cases whereas 7% of cases had multiple strictures. When length of the strictures were analysed, majority of cases (80%) had short strictures with length less than 2 cms. Only in 2% of cases the stricture length was observed to be more than 5cms. When associated features as noted by urethrogram, cystourethroscopy and ultrasound were analysed, it was noted that 15% of cases had hydronephrosis and hydroureter, of which 6% of them had residual urine also.

When the treatment given was considered, 21% of cases required emergency treatment in the form of catheterization or suprapubic cystostomy to relieve acute retention. When the definitive treatment given for

stricture urethra was considered, it was seen that the 30 cases underwent a total of 57 surgical procedures (Table 2).

Out of 10 patients who were treated with urethral dilatation as the first method of choice of treatment, 4 had good results but, in 6 of them, other modality like internal urethrotomy or meatoplasty was offered to make them asymptomatic. The success rate was 13.5% and most of the successful cases had meatal or submeatal stricture. Average period of hospitalization was 3 days and restenosis was observed in 60% of cases.

VIU was the initial procedure of choice in uncomplicated strictures and was carried out in 17 patients, who underwent a total of 25 procedures. In 15 patients this was the primary modality of treatment and they had undergone a total of 23 procedures because 6 of them underwent repeat procedure and 2 of them had undergone previous failed dilatation. The procedure was successful in 8 cases at the first instance whereas, it was repeated once in 4 cases and twice in 2 cases and buccal mucosal urethroplasty had to be carried out in 6 cases. Out of 17 patients, 10 had good results, giving a success rate of 59%. Of the total 25 procedures, 10 were successful; hence success rate was 40% for procedure alone. Mean duration of hospitalization was 10 days whereas catheterization was 7 days and restenosis was observed in 58% of cases.

Meatoplasty was carried out in 4 cases of meatal stenosis, out of which 3 were iatrogenic seen post circumcision and 1 was due to balanitis xerotica obliterans. Success rate was 100%. Mean hospitalization was 7 days and there were minimal complications.

Buccal mucosal free graft urethroplasty was carried out in 12 patients, out of whom 7 had undergone previous VIU, 3 had prior dilatations and 2 had multiple strictures in anterior urethra. Mean hospitalization was 15 days, complications were minimal and success rate was 100% (Table 3).

#### **IV. Discussion**

Urethral stricture in the male presents one of the common and challenging problems to the urologist and the search is still on for a satisfactory answer to this complex problem. The treatment depends on the etiology of the stricture and the nature, site and extent of the stricture.

The commonest etiology found in the present study was iatrogenic (43%) followed by trauma. Similarly many authors have found iatrogenic cause as the commonest etiological factor followed by traumatic cause [7, 8, 9]. Some decades ago, the most important cause of urethral stricture was infection, but with introduction of efficient antibiotics and extensive use of transurethral surgery, iatrogenic strictures have become more common.

The commonest site of stricture was at bulbar urethra (50%). This was followed by penile urethra (30%) and meatal urethra (13%). Multiple strictures were found in 7% of cases. Various other studies have also reported bulbar urethra being the commonest site of urethral stricture [10, 11].

In the present study 80% of the cases had short strictures i.e., stricture length was less than 2 cms. Similar results were reported in another study, in which 89.8% of the strictures measured less than 2 cms in length [9].

In the present study the success rate for dilatation was 40% and most of these successful cases were of meatal or submeatal strictures. Another study has reported similar success rate of 37.8% for dilatation alone [8]. Similar to the present study, most of the other studies had bleeding as the commonest complication i.e., 3.5 – 4.0% [12].

The overall success rate for VIU in the present study was 39% whereas the success rate for procedure alone was 59%. Similar success rates for VIU have been reported by various other studies [2, 13]. In the present study for VIU, mean duration of hospitalization was 10 days, catheterization was 7 days and complication of restenosis was 61%. In another study, the authors have opined that the technique of optical urethrotomy is fairly standard whereas the post operative regime differs greatly, particularly concerning the period of catheterization. It has been argued that the catheter should be left indwelling only until re-epithelisation has taken place [14].

In another study it has been reported that the risk of stricture recurrence after VIU and dilatation was greatest at 6 months, whereas the risk of failure after 12 months was slight. The recurrence rate at 12 months was approximately 40% for strictures shorter than 2 cm and 80% for strictures longer than 4 cms, whereas the recurrence rate for strictures 2-4 cms long increased from approximately 50% at 12 months to approximately 75% at 48 months [15].

Meatoplasty had 100% success rate in all the 4 cases of meatal stenosis that had undergone this procedure. Similar to the present study, meatoplasty with 100% success rate has been reported by various other authors [16, 8].

Using free mucosal grafts for urethroplasty is a simple and safe method in the interdisciplinary treatment of urethral strictures [17]. Buccal mucosal urethroplasty was carried out in 12 patients and it was noted to have 100% success rate after 5 months of follow-up regardless of initial treatment, length and etiology. Three other studies have noted 84% success rate for buccal mucosal urethroplasty [18, 19, 20] whereas, one study has reported a success rate of 88% [21] and another study has reported a success rate of 94% [22]. These

variations noted in success rates between different studies could be due to variations in the duration of follow up period.

## V. Conclusion

In the past two decades, there has been a revolution in the treatment of stricture urethra. Various types of urethroplasty are being used more often to offer a definitive cure to more and more patients. Buccal mucosa, readily available in all patients, has practical and physical properties that make it an ideal graft for urethral reconstruction. Also the success rate is almost 90-100% and complications are minimal. Hence buccal mucosal free graft urethroplasty has become a favourable option while treating urethral strictures.

## Acknowledgements

At the foremost, the authors would like to thank all the patients who participated in the study. The authors are also grateful to the management and the Dean and Principal, Kempegowda Institute of Medical Sciences, Bangalore, for permitting the study and usage of hospital facilities. The authors are also thankful to all the staff, KIMS Hospital for providing support and co-operation during the study.

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**Table 1: Analysis of etiology**

SI No	Aetiology	Sub cause	No of patients	Percentage
1.	Inflammatory stricture		11	37
		a) Gonococcal	2	7
		b) Non specific	8	27
		c) Balanitis Xerotica Obliterans	1	3
2.	Iatrogenic		13	43
		a) Catheter induced	8	26
		b) Post instrumentation	5	17
3.	Indeterminate		6	20

**Table 2: Number of procedures of different modalities of treatment**

Procedure	No. of Procedures	Remarks
Dilatation	16	Good results in 4 patients
Visual Internal Urethrotomy	25	17 initial, 8 repeat procedures. Succeeded in 10 cases
Meatoplasty	4	Succeeded in all the 4 cases
Buccal mucosal urethroplasty	12	Succeeded in all the 12 cases

**Table 3: Results of individual procedures**

Procedure	Mean Hospitalization	Complication	Symptom free period	Success %		Failure %
				Good	Satisfactory	
Dilatation	3 days	Haemorrhage- 3.5% UTI – 3.5% Restenosis – 60%	6 months after last dilatation		40%	60%
VIU	10 days	Haemorrhage- 5.4% UTI – 8.1%	5 months after 2 <sup>nd</sup> procedure	23.5%	35.3%	41%
Meatoplasty	7 days	No significant complication	Over 8 months	100%		Nil
Buccal Mucosal urethroplasty	15 days	No significant complication	5 months	100%		Nil

**Figures**



Figure 1: Buccal mucosa marking



Figure 2 : Exposed buccal mucosa

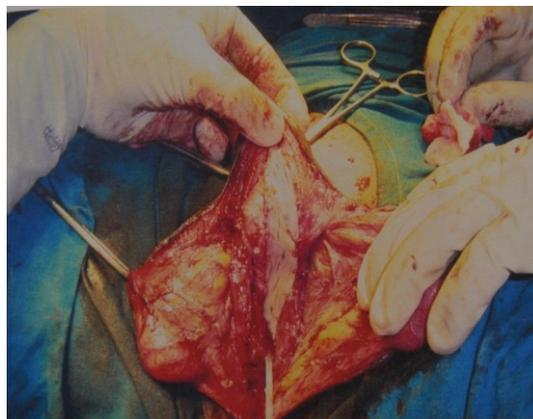


Figure 3: Harvesting the buccal mucosa



Figure 4: Closure after buccal mucosal harvesting