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# Outcomes of single stage Dorsolateral Onlay Buccal mucosal graft Urethroplasty in long segment anterior urethral stricture: A Single -Centre Study in a Tertiary Care Hospital in Eastern India.

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## ABSTRACT

**Objectives**: To evaluate the results of dorsolateral onlay buccal mucosal graft (BMG) urethroplasty in various types of long segment anterior urethral stricture.
**Materials and Methods**: This prospective study was conducted in the Department of Urology, R G Kar Medical College, Kolkata from April 2022 to March 2025. We studied 50 patients with long segment anterior urethral stricture, who underwent substitution urethroplasty using dorsolateral onlay BMG urethroplasty. Patients with anterior urethral stricture more than 1.5 cm were included as study population. They were assessed by detailed history, physical examination, ultrasonography of KUB with PVRU, uroflowmetry, retrograde urethrography and voiding cystourethrography, sono-urethrograms and cystoscopy. All patients were treated with dorsolateral onlay BMG urethroplasty. Patients were followed-up with uroflowmetry at 3 monthly for one year and RGU and/or urethroscopy if indicated. Success was defined as normal voiding pattern without any intervention post-operatively.
**Results**: The etiology of stricture was lichen sclerosus et atrophicus in 44% (22 cases). Pan anterior urethral strictures were more common. Out of total 50 cases, 42(84%) had successful outcome and 8 (16%) were failure.
**Conclusion**: We conclude that it is simple, technically feasible, easily adoptable and finally successful procedure.

***Keywords***: *Stricture, dorsolateral onlay urethroplasty, buccal mucosal graft*

## INTRODUCTION

Urethral stricture disease is a one of the most common urological problems in male worldwide specially in underdeveloped countries. Urethral strictures are fibrotic narrowing composed of dense collagen and fibroblast. These narrowing hinders urine flow and if severe and persist for prolonged period without correction results in backward pressure and dilatation of both upper and lower urinary tracts that ultimately leads to dilatation of proximal urethra, prostatic ducts, decompensation of the ureterovesical junction, reflux, hydronephrosis and deterioration of renal function or renal failure. Acute or chronic prostatitis is a common complication of urethral stricture. The bladder muscle may become hypertrophic, and increased residual urine may be noted. A decrease in urinary stream is the most common complaints. Spraying or double stream, post void dribbling, urinary frequency and mild dysuria may also be initial complaints. Induration in the area of stricture may be palpable. Periurethral abscess and urethrocutaneous fistula may also present. The bladder may be palpable or overflow incontinence is present if there is a chronic retention of urine. It has an incidence rate as high as 0.6% in some susceptible populations. Urethral strictures are the common disease in men with different etiologies, which have affected mankind since the beginning [1]. Meta-analysis of the literature has shown that most anterior strictures are iatrogenic (33%), idiopathic (33%), and to a lesser extent, trauma (19%) and inflammation (15%). Management of anterior urethral stricture poses a continuing urological challenge. The treatment of urethral stricture varies according to etiology, location, length, depth and density of the stricture (spongiofibrosis), multiplicity, proximity to sphincteric mechanism and the presence of local adverse factors. There are different treatment

option for short urethral stricture ranging from simple dilatation, directly visualized optical internal urethrotomy, resection and end to end anastomosis. Long segment anterior urethral strictures that are not amenable to end-end anastomosis require substitution urethroplasty or may be managed by two-stage urethroplasty with or without use of free graft. Although augmented anastomotic techniques are currently suggested for this kind of strictures, the material for reconstruction (flap or graft) and location of the graft on the urethral surface (ventral or dorsal) has become a continuous issue [2-4]. Long segment anterior urethral stricture that requires substitution urethroplasty uses penile skin flap, split and full thickness skin graft that can be derived from scrotum, penis, extragenital sites, tunica vaginalis, bladder mucosa, colonic mucosa, buccal mucosa or lingual mucosa. Buccal mucosa graft becomes an ideal urethral substitutes because contains no hair, flexible, easy to harvest, resistance to infection, compatibility with a wet environment, thick epithelium with a thin but well-vascularized lamina propria, allowing easy inosculation and survival. For the management of anterior urethral stricture, dorsal, ventral or lateral onlay urethroplasty may be employed as single-stage procedure [5]. Out of these, dorsal onlay urethroplasty currently most favoured [6]. We performed dorsolateral onlay urethroplasty by unilateral urethral mobilization [7,8]. In dorsolateral approach instead of circumferential mobilization of urethra, mobilization of urethra is done in one side, i.e., from ventral midline to beyond dorsal midline. It preserves neuro-vascular integrity of one side of urethra thus reduce ischaemia with resultant chordee. Entire procedure is carried out by a single perineal incision and no incision is made on the penis except meatotomy when required. Outcome of one stage transperineal dorsolateral onlay BMG urethroplasty was assessed in this study.

**Materials and Methods**

This prospective study was conducted in the department of urology, R G Kar Medical College Hospital, Kolkata from April 2022 to March 2025 having a total cases of 50 dorsolateral buccal mucosal graft urethroplasty. The age limit of the study population was 26 to 64 years. Patients with anterior urethral stricture more than 1.5 cm without any previous history of urethral dilatation, direct visual internal urethrotomy (DVIU) or prior urethroplasty were included as study population. Patients with severe co-morbidity, small stricture <1.5 cm, posterior urethral strictures, complete urethral blockade or stricture not allowing 6 Fr infant feeding tube were excluded from the study. Preoperative evaluation included detailed history documenting international prostate symptom score (IPSS), prior operative intervention, history of extra-marital sexual exposure, recurrent urinary tract infection, urethral discharge, trauma and history of any acute urinary tract obstruction leading to supra-pubic cystostomy. In physical examination, we looked for circumcised status, any surgical scar and health of preputial skin and oral mucosa. Urinalysis, ultrasonography of KUB region with post – voided residual, retrograde urethrography, voiding cystourethrography, sonourethrogram, uroflowmetry, urethroscopy and other routine investigations were done before surgery. Etiology of strictures, lichen sclerosus 22 cases, Idiopathic 11 cases, traumatic 8 cases, catheter induced (reactive) inflammatory 6 and infective 3 cases (Table 1). Mean stricture length, as measured by preoperative RGU was 6.8 cm (range 2.2 cm to 13 cm). Site of the strictures were pan anterior urethral (Figure 1) in 25 cases, penile in 5 cases, penobulbar in 11 cases and bulbar in 9 cases (Table 2).

**Table 1: Etiology of strictures.**

| Etiology of stricture | Number of patients |
|---|---|
| Lichen sclerosus | 22 |
| Idiopathic | 11 |
| Traumatic | 8 |
| Catheter induced inflammatory | 6 |
| Infective | 3 |
| Total | 50 |

**Table 2: Site of stricture urethra**

| Site of stricture | Number of patients |
|---|---|
| Pan anterior urethral | 25 |
| Penile | 5 |
| Penobulbar | **11** |
| Bulbar | **9** |
| **Total** | **50** |

General anaesthesia with nasotracheal intubation was given. Urethroplasty was performed in perineal approach, with the patients were positioned in the exaggerated dorsal lithotomy position. All pressure points were appropriately padded with cotton. Operation was performed by two team approach. The penis was everted through the midline perineal incision. The bulbocavernous muscle was exposed and divided. The corpus spongiosum of the anterior urethra was exposed. Then the bulbar urethra was dissected to separate from corporacavernosa on left side, so as to leave the right half attached and preservation of its lateral blood supply. By invaginating the penis, the penile urethra was similarly dissected up to the coronal sulcus [9]. Then the strictured segment of the urethra was identified and opened dorsolaterally.

Buccal mucosal harvesting was done from one or both cheeks with or without lower lip, depending on the length of the stricture. The graft was then defatted, multiple opening done and tailored to its proper size. The dissected urethra was rotated towards right side to expose the dorsolateral surface of the strictured segment of urethra and opened vertically extending the incision for about 1 cm both proximally and distally into the normal urethral lumen. The proximal and distal urethral lumen were calibrated. One edge of the graft was sutured to the margin fixed to the corpora with 4-0 polyglactin interrupted sutures. A 16 Fr silicone catheter was introduced. The other margin of the graft was sutured to the lateral margin of the urethra and the tunica of corporacavernoasa. Graft was placed unstretched to prevent chordee (Figure 2). At the end of the procedure spongioplasty was done. Separated muscles are apposed and skin closed with 3-0 vicryl suture.

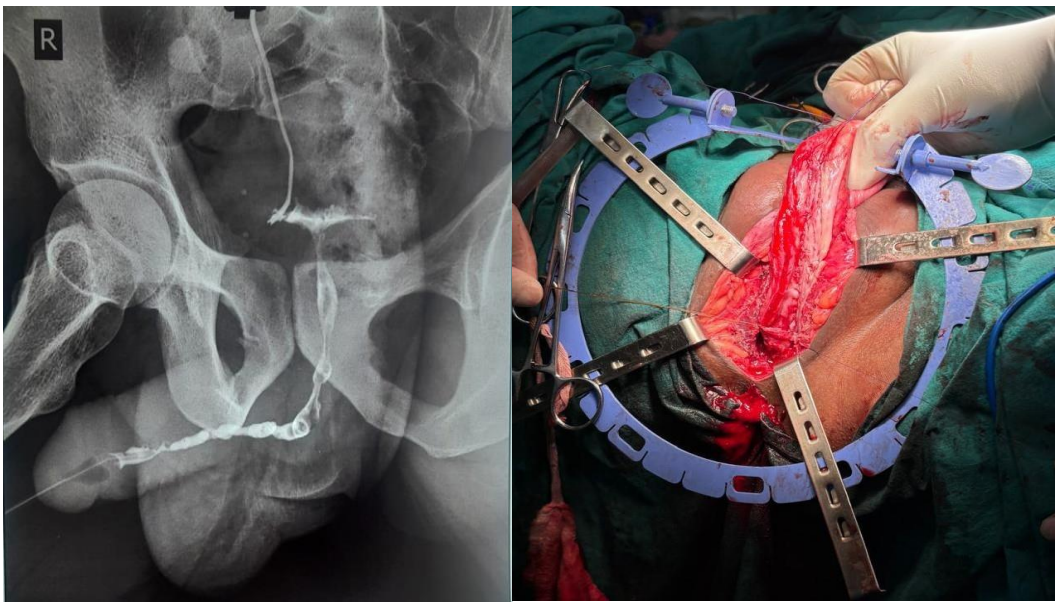


Figure 1 and Figure 2: ASU (digital) showing pan anterior urethral stricture and buccal mucosa (BMG) placed as dorsolateral onlay graft (Kulkarni's technique)

The patient remained bed rest for 72 hours and were discharged on the 5$^{th}$ to 7$^{th}$ post-operative days with catheter. All patients received broad-spectrum antibiotics and were kept on oral medications till removal of catheter. The catheter was left in situ for 3 weeks. After 3 weeks. a retrograde pericatheter urethrography was carried out and when no extravasation was found urethral catheter was removed. All patients were followed at 3 monthly intervals for one year and then six-monthly for 2 years and then annually. At each visit, patients were assessed for symptoms, urine culture and sensitivity, ultrasound to assess post void residual urine and uroflowmetry. The average follow up period of this study was 18 months.

Data were processed and analyzed using SPPS (Statistical Package for Social Sciences) software. The test statistics used to analyze the data were descriptive statistics, Chi-square test and student's t-Test. For all analytic tests, the level of significance was set at 0.05 and p value <0.05 was considered significant.

**Results**

A total of 50 patients (mean age 38 years, range 26 to 64 years) underwent dorsolateral onlay BMG urethroplasty between April 2022 to March 2025 in our hospital. Etiology of strictures, lichen sclerosus 22 cases (44%), Idiopathic 11 cases (22%), traumatic 8 cases (16%), catheter induced (reactive) inflammatory 6 cases (12%) and infective 3 cases (6%). Most common presentation was poor urinary stream. Mean stricture length, as measured by preoperative RGU was 6.8 cm (range 2.2 cm to 13 cm). Site of the strictures were pan anterior urethral in 25 cases (50%), penile in 5 cases (10%), penobulbar in 11cases (22%) and bulbar in 9 cases (18%) Mean operative time was 170 minute (range 145 to 220 minute). Buccal mucosa was harvested from both the cheeks in 33 cases (66%) and from both cheeks and lower lip 17cases (34%). Mean preoperative maximum flow rate (Qmax ) was 5.83 ml/sec and mean postoperative maximum flow rate (Qmax ) was 24.3 ml/sec. Pre operatively ultrasonography showed average post voided residual volume was 190.4 ml which was significantly high. Post operatively average post voided residue was less than 25 ml 41 cases (82%). Nine patients had narrowing at anastomotic site and presented with narrow urinary stream and prolonged voiding with abdominal straining. These patients were managed with Direct visual internal urethrotomy (DVIU). Two patients had developed acute urinary retention managed by suprapubic cystostomy and further urethroplasty procedure were required. During postoperative period seven patients (14%) developed mild wound infection, managed successfully with change in antibiotics as per culture sensitivity report and dressings. Two patients developed urethrocutaneous fistula and were managed conservatively. No patients developed diverticulum, sacculation formation, urinary incontinence, erectile dysfunction and lower extremity injury.

Graft harvesting site complications : all patients experienced mild post operative pain managed by good analgesia , facial swelling was reported six patients(12%). No patients encountered damage to stensen's duct but transient lip paresthesia developed five patients (10%) and three patients (6%) reported restriction in mouth opening but resolved within one month post operatively. No patients needed blood transfusion post-operatively.

**Table 3: Post-operative complications**

| Complications | No. of patients(%) |
|---|---|
| Restricture | 7(14%) |
| Wound infection | 7 (14%) |
| Urethrocutaneous fistula | 2 (4%) |
| Facial swelling | 6 (12%) |
| Lip Paresthesia, numbness | 5(10%) |
| Restriction in mouth opening | 3(6%) |
| Diverticula/sacculation | 0 (0%) |

**Discussion**

The term 'Urethral stricture' is specially used for narrowing or obliteration of lumen of anterior urethra due to scarring of urothelium and/or corpus spongiosum so that the lumen will not accommodate instrumentation without disruption of the urethral mucosal lining. A stricture involving the urethra that is surrounded by corpus spongiosum is considered an anterior urethral stricture, and the associated scarring may be associated with a scarring process involving the spongy erectile tissue of corpus spongiosum (spongiofibrosis). Posterior urethral stricture is not included in the definition of 'urethral stricture'. Posterior urethral injury (PUI) and posterior urethral stenosis are more appropriate terms. Posterior urethral stenosis is an obliterative process in posterior urethra that has resulted in fibrosis and is generally the effect of distraction or avulsion in the area caused by either trauma (pelvic fracture) or radical prostatectomy and is called 'Distraction Defect'. Urethral stricture disease has various etiologies. In developed countries post traumatic and post instrumentation are common causes of stricture but in underdeveloped country post inflammatory particularly balanitis xerotica obliterans the most common cause of stricture and they are long segment and panurethral. Catheter induced inflammatory stricture is also produced long segment urethral stricture. Urethral stricture disease has a great impact on patient's quality of life.

Urethral strictures are a frequent source of lower urinary tract disorders in adults. In our study balanitis xerotica obliterance is the most common cause of stricture, 22 cases (44%) and most of them were long segment and panurethral. Idiopathic 11 cases (22%), traumatic 8 cases (16%), catheter induced (reactive) inflammatory 6 cases (12%) and infective 3 cases (6%). Mean stricture length was 6.8 cm (range 2.2 cm to 13 cm). Most common site of the strictures was panurethral in 25 cases (50%) which are comparable to other study). Substitution urethroplasty with BMG is most commonly performed technique particularly for long segment anterior segment stricture and become standard of care. In the dorsal onlay technique, the conventional circumferential dissection of the whole anterior urethra risks the vascularity of the urethra, which may be more important if the meatus is involved with the disease and the distal most urethra is extremely dissected, such is seen with concomitant balanitis xerotica obliterans. In dorsolateral onlay approach urethra is mobilized in one side, which maintain vascular integrity of urethra. It also preserves the one sided bulbar artery in addition to maintaining the native lateral vascularity in the meatus and distal urethra. Furthermore, by using this approach, we did not find post -operative chordee in any case. In this study, the urethra is not completely mobilized off the corpora; hence, graft sizing is more appropriate, preventing the chordee. In this study total 50 patients underwent dorsolateral onlay BMG urethroplasty with overall success rate of 82 %. Mean follow up was 18 months. Urethroplasty by Kulkarni et al shows study on 24 patients with mean follow up of 22 months shows 22(92%) had a successful outcome and 2(8%) were failure [10]. Studies by Barbagli or Kulkarni on dorsal onlay urethroplasty have shown success rate more than 90%.

In general, complications are rare after BMG urethroplasty. Post-operative complications can occur in two areas, the site of harvest and site of urethral stricture repair [11]. Potential buccal mucosal harvest site complications include haemorrhage, pain, facial swelling, damage to Stensen's duct, lip paresthesia, numbness and restriction in mouth opening. Facial swelling and restriction in mouth opening are common, but are self- limiting and will resolve within the first few months of surgery [12,13] as reported in our study. Wood et al reported that closure of the harvest site was associated with worse pain and suggested that this may be improved by not closing [14]. Although Dublin et al. reported that patients did well with closure of the donar site, but 16% and 32% hsd long-term complaints of numbness and mouth tightness respectively. In our study we reported no difference of pain in two groups. Overall, the inner cheek donar site for BMG regardless of management appears to heal without complications as reported in our study [12,13]. Perineal complications are similarly rare. Wound infection, haematomas, skin paresthesia, restricture and other local infections do sometimes occur. In a study by Fichtner J et al. they reported overall complication rate of 25% (8 of 32) [15] . In one more

study overall complications rate was 5.4% with 5.7% restructure rate [12]. In our study we reported 18% overall complications rate which include restricture, wound complications and urethrocutaneous fistula.
**Limitations** includes the single center design, relatively small sample size, and short follow-up period.

**Conclusion**

Urethral stricture is debilitating disease affecting quality of life and reconstruction of urethra continues to be challenging for the reconstructive surgeon. The treatment option of urethral stricture disease depends on various factors like etiology, location, length, depth and density of the stricture (spongiofibrosis), multiplicity, proximity to sphincteric mechanism and the presence of local adverse factors. The goal of treatment of urethral stricture is to provide sufficient permanent patency of the urethra to void urine without difficulties. Single stage reconstruction urethroplasty is preferable than staged procedure if not otherwise contraindicated. Buccal mucosal graft urethroplasty becomes standard care for long segment anterior urethral stricture. It is easy to harvest and to handle, is resilient to infections and accustomed to a wet environment. The preservation of one sided vascular supply to the urethra and its entire muscular and neurogenic support represents significantly towards perfecting the surgical technique of urethral reconstruction using a minimally approach like dorsolateral onlay BMG urethroplasty. A stricture should not be considered "cured" until it has been observed for at least one year after therapy, since it may recur at any time during that period. In our study, we found that it is safe, technically feasible, easily adoptable, reproducible and finally successful procedure. Our study is comparable to other available studies.

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