

## Original Research Article

# Outcome of substitutional urethroplasty by using dorsal onlay buccal mucosal graft: our experience of 10 years

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### ABSTRACT

**Background:** The term urethral stricture is anterior urethral disease, or a scarring process involving the spongy erectile tissue of the corpus spongiosum.

**Methods:** Total 127 patients were included in the study. Patient selection criteria for urethroplasty by using buccal mucosal graft was length of stricture more than 2 cm, deep spongiofibrosis, failed optical urethrotomy for 3 times, adequate oral hygiene and proper buccal mucosa.

**Results:** Length of stricture varied from 3.2 to 14 cm. In first postoperative week, 20.47% (n=26) patients developed minor wound infection culture negative seroma formation in stitch line in the skin. Donor site complications like eating and drinking difficulty, dysgnesia, pain, sensitivity, speaking disorders were not found in any patient while oral tightness was noted in 43.30% (n=55) of patients. On postoperative follow-up mean peak urinary flow rate ( $Q_{max}$ ) was 28.0 ml/sec (range 20.0-30.6 ml/sec). After a mean follow-up of 8.8 months range (1 month to 33 months) overall success rate was 90.55% (n=115).

**Conclusions:** Buccal mucosa is an excellent graft material for substitution free graft urethroplasty in case of long anterior urethral stricture with excellent success rate. Success rate of dorsal onlay substitution free buccal mucosal graft urethroplasty is affected by length of stricture and aetiology of strictures. Lichen sclerosus having moderate success rate of urethroplasty and higher rate of complication and failure rate in 1-stage buccal mucosal urethroplasty and can be considered for two stage urethroplasty in case of very long stricture of anterior urethra of lichen sclerosus origin.

**Keywords:** Buccal mucosal graft urethroplasty, Dorsal onlay BMG, Free grafts, Stricture urethra

### INTRODUCTION

The term urethral stricture generally refers to anterior urethral disease, or a scarring process involving the spongy erectile tissue of the corpus spongiosum (spongiofibrosis). The spongy erectile tissue of the corpus spongiosum underlies the urethral epithelium, and in some cases, the scarring process extends through the tissues of the corpus spongiosum and into adjacent tissues. Contraction of this scar reduces the urethral lumen.

To device an appropriate treatment plan, it is important to determine the location, length, depth and density of stricture. These can be accomplished by using physical examinations, dynamic contrast studies (retrograde urethrography and micturating cystourethrography), high resolution ultrasonography, real time ultrasonography, urethro-cystoscopy.

The treatment options for urethral stricture includes: dilatation-(oldest and simplest), urethrotomy (optical internal urethrotomy and laser urethrotomy),

urethroplasty (excision and primary re-anastomosis, excision and substitution, pedicled vascularised flaps, Staged procedures).<sup>11</sup> Buccal mucosa as a potential graft material for urethral reconstruction was first described by Humby in 1941.<sup>12</sup> Excellent results were seen with buccal mucosal urethroplasty technique.

## **METHODS**

This was observational type of study carried out to know the outcome of substitutional urethroplasty by using dorsal onlay buccal mucosal graft in urology unit of P.G. Department of General Surgery, MLN Medical College & SRN Hospital, Allahabad from January 2011 to January 2021.

### ***Patients were subjected to the following line of management***

It's an observational type of study for which hospital record and interview of the patients taken. A detailed history and physical examination was done to establish the etiology and diagnosis of the stricture.

Examination of oral cavity: buccal mucosa for submucosal fibrosis, inflammation, chronic ulcer, teeth-deposits, hard (calculus), soft (plaque), carious teeth, gingivitis, periodontitis.

### ***Investigations***

Hematological: Hemoglobin, total and differential white blood cells count, blood sugar, Serum urea and serum creatinine, Viral markers - HBsAg, HCV, HIV (I & II).

Urine examinations: routine/microscopic; culture and sensitivity.

Radiological: Retrograde Urethrography (RGU); Micturating cysto urethrography (MCU); high resolution ultrasonography of urethra and penis.

### ***Inclusion criteria***

Length of stricture more than 2 cm or long anterior urethral strictures, deep spongiofibrosis (Grade II & Grade III stricture), failed optical urethrotomy for three times, oral hygiene should be adequate were included.

Data of total of 218 patients with stricture urethra were explored, out of which 127 patients with long (> 2.cm) stricture of anterior urethra included in the study. We have used excel for data analysis after taking ethical approval.

### ***Exclusion criteria***

Short strictures (length <2cm), frade I strictures, up to two times failed optical urethrotomy, bad oral hygiene and having submucosal fibrosis of buccal mucosa, unable

to tolerate general or regional anesthesia and active intraoral infection and urinary tract infection were excluded.

### ***Technique***

#### ***Anaesthesia***

Procedure of placement of graft will be under spinal anaesthesia and general anaesthesia with naso-tracheal intubation for buccal mucosal graft harvesting. In those cases where patients are child or patients are not cooperative, general anaesthesia was employed for whole procedure.

#### ***Preparation of the bulbar urethra***

The patient is placed in lithotomy position, methylene blue is injected into the urethra and a midline perineo-scrotal incision is made. The bulbo-spongiosus muscles are separated in the midline and, in patients with proximal bulbar urethral stricture, the central tendon of the perineum is dissected. The bulbar urethra is then freed from the bulbo-spongiosus muscles, urethra is incised and distal extent of stricture is identified. Strictured part of urethral segment is incised dorsally in whole length over corpora cavernosa in midline and dilated to make a bed for graft.

#### ***Preparation and suture of the buccal mucosa graft***

The inner cheek as well as the lower lip was used as a donor site. Buccal mucosa harvesting increases operative time. Thus, a 2-team approach was used. The perineal team exposes and measures length of strictured segment, while another team simultaneously harvests the graft from the mouth. The buccal mucosa graft is spread-fixed and quilted to the overlying tunica albuginea of the corporal bodies. The right mucosal margin of the opened urethra is sutured to the right side of the patch graft and left urethral margin is sutured to the left side of the patch graft (Figure 1). A 14 Fr silicone foley catheter is inserted urethral tube is made over catheter (Figure 2).

The bulbo-spongiosus muscles are approximated over urethra. A small corrugated drain is placed as and when required, and an indwelling 14Fr silicone Foley catheter is left in place.

#### ***Post-operative care***

Every patient will be given broad spectrum antibiotic. Watch for post-operative complication of wound infection and dehiscence. Peri-catheteric dye study will be done on each patients on 21st day to see for any extravasation at anastomosis site. If there is any extravasation then the catheter will be kept for further 7 to 10 days and repeat dye study will be done.

After three weeks if there is no peri-catheteric dye spillage, the bladder is filled with contrast medium, the Foley catheter is removed and a voiding cystourethrography is obtained. Uroflowmetry and urine culture is repeated every 3 months during the first two year and yearly thereafter. Radiological studies are repeated when uroflowmetry is less than 10 ml per second. Patients were instructed to perform clean self-intermittent catheterization (CSIC) daily with 16 Fr foley catheter for six months. Urethrocystoscopy - when recurrence is suspected. Pt. is called for follow up weekly for 1 month then fortnightly for three month, then monthly for six months after that three monthly for two years. Clinical outcome was considered failure in any case if postoperative instrumentation needed, including dilatation. Patient should not be considered cured until it has been observed for at least one year after surgery.

## RESULTS

### Age distribution

Age of patients studied ranged from 21 to 60 year (Table 1).

### Etiology

Table 2 describes etiology wise distribution.

### Presenting symptoms and complications

Thinning of urinary stream was the commonest presenting symptom (Table 3).

**Table 1: Distribution of patient in various age group.**

| Age group (in years) | No. of cases | Percentage |
|----------------------|--------------|------------|
| 21-30                | 56           | 44.09      |
| 31-40                | 29           | 22.83      |
| 41-50                | 28           | 22.04      |
| 51-60                | 14           | 11.02      |
| > 61yr               | 0            | 0          |
| <b>Total</b>         | <b>127</b>   | <b>100</b> |

**Table 2: Etiology of stricture formation in various parts of anterior urethra.**

| Etiology            | Penile urethra | Bulbopendular urethra | Bulbar urethra | Total      | Grand total |
|---------------------|----------------|-----------------------|----------------|------------|-------------|
| <b>Inflammatory</b> |                |                       |                |            |             |
| Urethritis          | 25             | 15                    | 10             | 50         | 89          |
| Lichen sclerosus    | 9              | 30                    | -              | 39         |             |
| <b>Trauma</b>       |                |                       |                |            |             |
| Accidental          | 8              | -                     | 12             | 20         | 38          |
| Iatrogenic          | -              | -                     | 18             | 18         |             |
| <b>Total</b>        | <b>42</b>      | <b>45</b>             | <b>40</b>      | <b>127</b> | <b>127</b>  |

**Table 3: Presenting symptoms.**

| Symptoms                                       | No. of cases | Percentage |
|--|--------------|------------|
| <b>Thinning of stream</b>                      | 127          | 100        |
| <b>Dysuria</b>                                 | 51           | 40.15      |
| <b>Acute retention of urine</b>                | 55           | 43.30      |
| <b>Frequency</b>                               | 45           | 35.43      |
| <b>Nocturia</b>                                | 20           | 15.74      |
| <b>Epididymo-orchitis (testicular abscess)</b> | 15           | 11.81      |
| <b>Penile abscess</b>                          | 10           | 7.87       |

**Table 4: Location of strictures in anterior urethra.**

| Stricture site within anterior urethra     | No. of patients | Percentage |
|--|-----------------|------------|
| <b>Penile urethra with meatal stenosis</b> | 51              | 40.15      |
| <b>Bulbar urethra</b>                      | 21              | 16.53      |
| <b>Bulbo-penile urethra</b>                | 55              | 43.30      |

**Site of stricture**

Ten patients were presented with bacteremia and severe urinary tract infection. Trabeculation of bladder was found in 40.15% (n=51), bladder diverticulum in 11.81% (n=15) and hydronephrosis in 9.44% (n=12) patient (Table 4).

**Length of stricture**

Length of stricture varied from 3.2 to 14 cm. Mean length was 8.0 cm.

**Pattern of stricture**

76 patients had multifocal irregularity and 51 had uniform irregularity in preoperative retrograde urethrogram.

**Post operative complications**

In first postoperative week, 20.47% (n=26) patients developed minor wound infection culture negative seroma formation in stitch line in the skin that dried up after dressing and proper broad spectrum antibiotic coverage. After three weeks on pericatheteric radiocontrast study 21.25% (n=27) had extravasation of dye from anastomotic site. Twenty one patients who were known cases of type 2 diabetes mellitus and chronic obstructive pulmonary diseases had extravasation from distal anastomotic site in bulbar urethra. Etiology of stricture in these patients were balanitis xerotica obliterans and the mean stricture length was 11.4cm. Six patients had extravasation from proximal anastomotic site. Etiology of stricture in these patients were same and the mean stricture length was 13.0cm. Catheter was retained in all these patients and on repeat pericatheteric radiocontrast study on patients that had distal anastomotic site improved and showed normal study, but in four patients having proximal anastomotic site extravasation persisted and were declared as failure (Urethro-cutaneous fistula formation). Donor site complications like eating and drinking difficulty, dysgnesia, pain, sensitivity, speaking disorders were not found in any patient while oral tightness were noted in 43.30% (n=55) of patients. Chordae or erectile dysfunction of new origin was not found in any patient.

**Preoperative and postoperative follow-up peak flow rate evaluation**

Preoperative peak flow rate evaluation was done in 29.92% patients (n=38) with mean peak urinary flow rate (Qmax) 8.8 ml/sec (range 7.2-10.6 ml/sec). 70% patients (n=89) were having suprapubic cystostomy. Suprapubic cystostomy was done for acute retention of urine in 40 cases and for urinary diversion due to other reasons in 49 cases. On postoperative follow-up mean peak urinary flow rate (Qmax) was 28.0 ml/sec (range 20.0-30.6

ml/sec).

**Success rate of dorsal onlay buccal mucosa graft urethroplasty**

After a mean follow-up of 8.8 months range (1 month to 33 months) overall success rate was 90.55% (n=115). Success in isolated penile and bulbar groups was 100% and in very long bulbo-penile strictures it was 81.81%. Success rate on the basis of etiology was excellent (100%) in strictures due to urethritis and accidental and iatrogenic trauma; moderate (74.35%) in cases of lichen sclerosis.

**DISCUSSION**

In this study mean age of patient was 31.75 years (range 21-60 years). Patient in age group of 21-50 years accounted for 89% (n=113) and 44.09% (n=56) of cases were of age group 21-30 years (Table 1). This is consistent with age incidence reported by Bhandari et al who reported peak age incidence in age group 20.8-30.5 years (25.30%, n=21) with the age ranged from 5 to 80 years, mean age 36 years in 88 patients of stricture penile urethra.<sup>1</sup>

Long anterior urethral stricture of 70% of patients (n=89) were of inflammatory origin, 39.37% of patient (n=50) were of urethritis origin and 30.70% (n=39) having lichen sclerosis (Balanitis xerotica obliterans). 30% patients (n=38) were of traumatic origin out of which 15.74% patients (n=20) of accidental trauma of urethra and 14.17% (n=18) due to iatrogenic trauma. This is consistent with etiology of long anterior urethral stricture reported by Jain et al, who reported in their study of 12 patients of dorsal onlay buccal mucosa.<sup>2</sup> Substitution urethroplasty in long stricture of anterior urethra 56.7% (n=7) of patients were of inflammatory origin and 25% (n=3) cases were of traumatic origin.

Levine et al in their study of 53 patients reported very similar incidence of lichen sclerosis in etiology of long anterior urethral stricture 24.35% (n=13).<sup>3</sup> Dutta et al in their study of 43 patients reported etiology of long anterior urethral stricture idiopathic 53.5% (n=23) traumatic 20.9% (n=9), Lichen sclerosis 9.3% (n=4), iatrogenic 9.3% (n=4) infective 6.9% (n=3).<sup>4</sup> Meneghini et al in his study of 20 patients.<sup>5</sup> Reported etiology inflammation 20% (n=4) iatrogenic 25% (n=5) idiopathic 55% (n=11).<sup>5</sup>

Site of stricture was penile urethra in 40.15% (n=51), Bulbar urethra 16.53% (n=21), bulbo-penile in 43.30% (n=55), acute retention of urine in 43.30% (n=55), frequency in 35.43% (n=45), nocturia 15.74% (n=20), epididymo-orchitis with testicular abscess in 11.81% (n=15) and penile abscess in 7.87% (n=10) cases. Similar presentation of patients were also reported by many authors in their study which are: Thomas et al reported symptoms at diagnosis of bulbar urethral stricture in his

study of 199 patients as decreased force of stream in 77 (39%), urinary retention in 17 (9%) epididymitis in 2 (1.00%) and other symptoms.<sup>6</sup>

Trabeculation of bladder was found in 40.15% (n=51), bladder diverticulum in 11.81% (n=15), hydronephrosis in 9.44% (n=12), bacteraemia 7.87% (n=10) and penile abscess in 7.87% (n=10). Similar complications has been reported by John et al in 141 strictures treated by dilatation, bladder complication in 17.7% (n=25), renal in 3.5% (n=5) urethral in 17% (n=24) and infection in 12.8% (n=18).<sup>7</sup>

Postoperative and follow-up period wound infection was found in 26 patients (20.47%). Four patients developed urethrocutaneous fistula. Donor site complications like eating and drinking difficulty, dysgnesia, pain, sensitivity, speaking disorders were not found in any patient while oral tightness were noted in 43.30% (n=55) of patients. Chordae or erectile dysfunction of new origin was not found in any patient. This is consistent with the studies of Jain et al who reported wound infection in 16.67% (n=2), fistula in 8.33% (n=1), post void dribbling in 16.67% (n=2) and ejaculatory dysfunction in 16.67% (n=2).<sup>2</sup>

Preoperatively mean peak urinary flow rate, Qmax (in whom SPC was not present) was 8.8 ml/sec (range 7.2-10.6 ml/sec) increased to mean peak urinary flow rate 28.0 ml/sec (range 20.0-30.6 ml/sec). Datta et al in their study of 43 patients reported preoperative mean peak urinary flow rate, Qmax = 8.4 ml/sec (4-11 ml/sec) and after buccal mucosal urethroplasty mean peak urinary flow rate raised to Qmax = 28.8 ml/sec.<sup>4</sup> Jain et al in a study of 12 patients reported preoperative mean peak urinary flow rate, Qmax = 8.3 ml/sec which increased to 18.1ml/sec after buccal mucosal urethroplasty.<sup>2</sup>

Overall success rate in present study of 127 patients of mean age 31.75 years (range 21 to 60 years) long anterior stricture with mean length of 8.0 cm (3.2-14 cm range) in mean follow up of 8.8 months (range 1 month-33months), was 90.55%. Similar results have also been reported by many authors in dorsal onlay buccal mucosa substitution free graft urethroplasty which are as follows:

Levine et al in their study of 53 patients who underwent one or two stage urethroplasty by substitution free buccal mucosal graft has a success rate of all urethroplasties 81% (n=43) at a mean follow up of 52 months.<sup>3</sup> El. Kassaby et al in their study of one stage repair of long bulbar urethral stricture using augmented dorsal strip anastomosis of total 234 patients having long bulbar urethral strictures (>2 cm) mean length 4.2 cm, in duration of 10 years, had overall success rate 93.7%.<sup>8</sup> Meneghini et al in their study of 20 patients with bulbar urethral stricture underwent single stage urethroplasty by using buccal mucosa graft in mean follow up of 13 m (range 6-28 cm), for stricture of mean length 3.6 cm (range 2.5-5 cm) overall success rate was 80%.<sup>5</sup>

McLaughlin et al reported success rate 94% in study of 57 patients with mean stricture length 3.9 cm in average follow up of 29.6 months.<sup>9</sup> Bhargava et al reported 96% success rate in 130 patients in whom dorsal onlay buccal mucosal free substitutional graft was used.<sup>10</sup> Jain et al reported 91.7% success rate in their study of 12 patients with mean stricture length 10.1 cm in average follow-up of 14.2 months.<sup>2</sup>

Success in terms of different parts of anterior urethra was 100% (n=51) in penile, 100% (n=21) in bulbar and 81.81% (n=45) in pan-urethral strictures and etiology wise it was 100% in urethritis as well as trauma and 74.35% (29 of 39) in case of lichen sclerosus. Levine et al in their study of 53 patients reported 13 patients with lichen sclerosus.<sup>3</sup> Dorsal onlay buccal mucosa urethroplasty success was achieved in 4 of 8 (50%) with 1-stage repair and in multistage repair 4 of 5 (80%).

Success rate of dorsal onlay substitution free buccal mucosal graft urethroplasty is affected by length of stricture and aetiology of strictures. Lichen sclerosus having moderate success rate of urethroplasty and higher rate of complication and failure rate in 1-stage buccal mucosal urethroplasty and can be considered for two stage urethroplasty in case of very long stricture of anterior urethra of lichen sclerosus origin.

## CONCLUSION

The conclusions drawn from this study are as follows: Most common age group of long anterior urethra stricture occurrence is 21-30 years. Inflammatory stricture (including urethritis and lichen sclerosus) is most predominant aetiology of long anterior urethra stricture. Lichen sclerosus is commonest cause of very long pan-anterior urethral stricture (bulbo-penile) starting from meatus upto bulbar urethra. Stricture of anterior urethra most commonly present with symptom of thinning of urinary stream. Buccal mucosa is an excellent graft material for substitution free graft urethroplasty in case of long anterior urethral stricture with excellent success rate.

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