



PROSPECTIVE STUDY COMPARING BUCCAL MUCOSA GRAFT AND FLANK SKIN GRAFT FOR URETHRAL STRICTURE

General Surgery

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KEYWORDS

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INTRODUCTION:

Urethral stricture is a narrowing of the urethra due to scar tissue, which leads to obstructive voiding dysfunction with potentially serious consequences for the entire urinary tract. It produces obstructive and irritative urinary symptoms and it can ultimately impair renal function.¹

Almost all strictures for which a cause can be identified are acquired. The largest group (45%) are iatrogenic and result from urethral manipulations (traumatic indwelling catheter, transurethral interventions, corrections of hypospadias, prostatectomy, brachytherapy).^{2,3} Transurethral procedures for strictures with unfavorable characteristics are not only futile but can also complicate stricture characteristics by increasing tissue damage if they are repeated.⁴ It has been suggested that previous repeated transurethral procedures are associated with a higher failure rate of urethroplasty.^{5,6}

Buccal mucosa graft (BMG) was first described for urethral reconstruction by Humby in 1941.⁷ It has become an ideal urethral substitute because of ease of harvest, surgical handling characteristics, hairlessness, compatibility in a wet environment, and its early ingrowth and graft survival. Standard bulbar urethroplasties using buccal grafts should have a lifetime success rate approaching 92%.^{8,9}

Anastomotic repair remains the gold standard and has a higher success rate than other methods.¹⁰ However, strictures longer than 2 cm that are not amenable to anastomotic repair require substitution urethroplasty, where a graft is used to substitute the urethral mucosa. Whilst substitution urethroplasty is an established and accepted treatment,^{11,12} there is currently no clear consensus on the best graft material.

A variety of pedicled and free grafts have been used including split and full-thickness skin grafts (genital and extragenital), bladder mucosa, colonic mucosa, tunica vaginalis, tissue-engineered grafts, and intra-oral mucosa (buccal or lingual).^{13,14} Non-hirsute full-thickness skin grafts are associated with donor site issues, stricture recurrence, and lichen sclerosis (previously known as balanitis xerotica obliterans).¹⁵ Results of studies utilizing tissue-engineered grafts are equivocal and long-term follow-up is not available.^{16,17}

Reconstruction of long-segment adult urethral stricture disease as a result of lichen sclerosis (LS) or failed pediatric hypospadias repair remains a difficult urological problem mainly due to the deficiency of available extra-genital skin for grafting. Graft tissue has been utilized successfully for urethral reconstruction from various sites including buccal mucosa, genital skin, and auricular tissue; however, each tissue source has specific drawbacks. The ideal graft source would be extra-genital in origin, hairless, produce minimal postoperative mobility at the harvest site, be inconspicuous postoperatively and abundant enough in length and width to avoid multiple urethral suture lines for men with long-segment strictures. To develop an alternative to

available graft sources for complex and long-segment strictures we describe the harvest and application of a full-thickness lateral abdominal skin graft for urethral reconstruction.

MATERIAL AND METHOD:

All the patients with history and clinical examination suggestive of urethral stricture attending surgical out-patient department and those coming for follow up in out-patient department at regular intervals was considered for the study. The study was conducted after approval from ethical committee and obtaining written and informed consent from the patients.

INCLUSION CRITERIA:

includes all patients with stricture length >2.5 cm and who need buccal mucosa graft or flank skin graft for urethroplasty and are willing for investigations and treatment.

EXCLUSION CRITERIA:

Patients with stricture length <2.5cm are not included in our study. , patients who weren't willing to participate in this study, patients who had perineal and groin infection, patients who had previous urethroplasties are considered for flank skin graft, pan anterior urethra stricture, stricture with complicating factors such as fistula diverticulae, periurethral abscess etc.

All patients were divided into two groups.

Group A: Patients who underwent buccal mucosa graft.

Group B: Patients who underwent flank skin graft.

Examination Oral Cavity:

- Teeth deposits
- Plaque
- Gingivitis
- OSMF (Oral sub mucosal fibrosis)

Radiological investigation:

Retrograde Urethrogram (RGU)- To delineate the pathology of anterior and membranous urethra.

Micturating Cysto-Urethrogram - To know the condition of urinary bladder and posterior urethra.

Urethrocystoscopy - On cystoscopy stricture appears as circumferential scar. Any additional area of scar near stricture may be detected by urethrocystoscopy.

Uroflowmetry - Was performed post-operatively on day 21 to see the flow rate and then at follow-up every 3 months.

Substitutional Urethroplasty:

Various methods used in substitutional urethroplasty:

1. Buccal Mucosa graft
2. Full-thickness graft like flank skin graft
3. Genital full-thickness pedicled graft
4. Post auricular graft
5. Bladder Mucosa graft
6. Split thickness graft

Anaesthesia:

Buccal Mucosa graft harvesting is done under general anaesthesia with nasotracheal intubation. Placement of graft for urethra formation is done under spinal anaesthesia.

Flank skin graft is done under spinal anaesthesia. Hairs present if any were removed to avoid complications like urethra site hair growth.

There were two techniques used in our study:- 1) Dorsal Onlay and, 2) Dorsal inlay

Postoperative care :

- Patients were kept on broad-spectrum antibiotics.
- Patients were looked for postoperative complications of wound infection, seroma, and hematoma formation.
- Uroflometry has been done at 28 days and thereafter every 3 months.
- Patients were instructed to perform CIC (clean intermittent catheterization) by self with 14F or 16F catheter for 6 months.

OBSERVATION:

The study included a total of 50 patients who were diagnosed with urethral stricture who attended the urology OPD from September 2018 to August 2019. The patients were initially diagnosed clinically by experienced urologist and further confirmed by Retrograde Urethrogram (RGU) and Micturating Cysto-Urethrogram by experienced radiologists.

Age Distribution:

Out of 50 patients group A had 12 patients aged between 21-30 years, 11 patients aged between 31-40 years, and 2 patients aged between 41-50 years. Group B had 10 patients aged between 21-30 years, 12 patients aged between 31-40 years and 3 patients between 41-50 years.

Distribution of patients based on etiology:

Out of 50 patients of urethral stricture, in 22 patients the etiology was post-inflammatory, 8 patients had Balanitis Xerotica Obliterans (BXO), 3 patients had history of trauma. In 13 patients etiology of stricture was idiopathic and in 4 patients stricture was due to iatrogenic cause.

Distribution based on stricture length:

Out of 50 patients, 6 patients had stricture length between 2.5 to 4 cm, 17 patients had stricture length between 4.1 to 5.5, 23 patients had stricture length between 5.6 to 7 cm and 4 patients had stricture length between 7.1 to 8.5 cm.

Distribution based on site of stricture:

Out of 50 patients, 14 patients had stricture in penile urethra, 30 patients had stricture in peno-bulbar urethra and 6 patients had stricture in bulbar urethra.

Distribution based on duration of surgery:

Out of 50 patients, 3 patients had duration of surgery between 151 to 160 minutes, 11 patients had surgery duration between 161-170 minutes, 26 patients had surgery duration between 171 to 180 minutes, 9 patients had surgery duration between 181-190 min and 1 patient had surgery duration between 191-200 minutes.

Distribution based on duration of hospital stay:

The duration of hospital stay can be divided into two groups, ≤ 2 weeks, and > 2 weeks. In Group A 20 patients stayed in hospital for ≤ 2 weeks, 5 patients stayed for > 2 weeks. In Group B, 21 patients stayed in hospital for ≤ 2 weeks, 4 patients stayed for > 2 weeks. (P value is 0.370455)

Table No. 1 Distribution based on duration of hospital stay

Hospital Stay	≤ 2 weeks	> 2 weeks
Group A	20	5
Group B	21	4

Post-Operative Q_{max}:

Out of 50 patients, 05 patients had Q max < 15 ml/s, 20 patients had Q max > 15 for Group A and 08 patients had Q max < 15 ml/s, 17 patients had Q max > 15 for Group B. (P value is 0.33425)

Table No. 2 : Post-Operative Q max

Qmax (ml/s)	Group A	Group B
< 15	05	08
≥ 15	20	17

Distribution based on indication for Suprapubic Cystostomy (SPC):

In group A, 5 patients presented with dysuria, 13 patients had complaints of acute retention of urine, 4 patients had thinning of stream, and 3 patients complaint of increased frequency. In group B, 5 patients had complaints of dysuria, 12 patients complaint of acute retention of urine, 5 patients had thinning of stream, and 3 patients complaint of increased frequency.

Early post-op complication:

In Group A, 7 patients developed early post-op complications, whereas in Group B, 9 patients developed early post-op complications. (P value is 0.54429)

Table No. 3: Early post-op complication

Complications	Present	Absent
Group A	07	18
Group B	09	16

Late post-op complication:

In Group A, 7 patients developed late post-op complications, whereas in Group B, 10 patients developed late post-op complications. (P value is 0.370455)

Table No.4: Late post-op complication

Complications	Present	Absent
Group A	07	18
Group B	10	15

Distribution based on success rate:

The Chi-square statistic is 0.9356. The p-value is 0.33425 which shows that the result is not significant. In our study, group A has success rate of 80% and group B has success rate of 68%.

(Our success rate is defined on the basis of peak flow rate/Q max, in which Q max > 15 considered as a successful procedure.)

Table No. 5: Distribution on the basis of success rate

Group	Success		Failure	
	Number of patients	%	Number of patients	%
Group A	20	80	5	20
Group B	17	68	8	32

DISCUSSION:

The present study is a prospective study comparing buccal mucosa graft and flank skin graft for urethroplasty. It included 50 patients of urethral stricture which were divided into two groups, Group A and Group B. Group A included 25 patients who were managed by buccal mucosa graft. Group B included 25 patients who were managed by flank skin graft.

Observations were made related to age distribution, etiology, presenting symptoms, site of stricture, length of stricture, duration of surgery, duration of hospital stay, Qmax, postoperative complications, and overall success rate. This study was conducted at the urology unit of P.G. Department of surgery, Swaroop Rani Nehru Hospital, M.L.N. Medical College, Prayagraj from September 2018 to August 2019.

In this study mean age of patient was 34.64 years (range 22-50 years). Patient in age group of 21-30 years, 44.0% (n=22) of total patients. This is consistent with age incidence reported by Bhandari M et al. (1983)¹⁸ who reported peak age incidence in age group 20.8-30.5 years (25.3%, n=21) with the age ranged from 5 to 80 years, mean age 36 years in 88 patients of stricture penile urethra.

In the present study of long anterior urethral stricture 44% of patients (n=22) were of inflammatory origin, lichen sclerosus (Balanitis xerotica obliterans). 14% patients (n=7) were of traumatic origin out of

which 6% patients (n=3) of accidental trauma of urethra and 8% (n=4) due to iatrogenic trauma. In 26% patients (n=13) etiology was idiopathic.

Meneghini A et al. (2001)¹⁹ In his study of 20 patients. Reported etiology inflammation 20% (n=4) iatrogenic 25% (n=5) idiopathic 55% (n=11).

Tavakkoli Tabassi, K and Ghoreifi A. in (2014)²⁰ In their study of 117 patients, the etiology of the urethral stricture was sexually transmitted disease (STD) in 17 (14.53%), lichen sclerosus in 15 (12.82%), trauma in 15 (12.82%), catheterization in 13 (11.11%), transurethral resection (TUR) in 6 (5.13%), and unknown in 51

Dutta B. et al. (2006)²¹ In their study of 43 patients reported etiology of long anterior urethral stricture idiopathic 53.5% (n=23) traumatic 20.9% (n=9), Lichen sclerosus 9.3% (n=4), iatrogenic 9.3% (n=4) infective 6.9% (n=3).

In our study mean stricture length was 5.71 cm (3 to 8cm) at different locations of urethra.

N.P. Gupta et al. (2004)²² reviewed their experience in treating 12 patients with a long anterior urethral stricture had the anterior urethra reconstructed, using a one stage urethroplasty with a dorsal on lay buccal mucosal graft through a ventral sagittal urethrotomy. The mean (range) length of the stricture was 5 (3–16) cm.

Barbagli et al. (2004)²³ reviewed a total of 45 patients with mean graft length 4.7 cm (range 2.5 to 11 cm)

Christopher E. Iselin et al. (1999)²⁴ reviewed 29 men with a mean age of 43 years (range 10 to 81) who underwent dorsal onlay graft urethroplasty. Mean graft length was 6 cm. (range 3 to 9), and width ranged between 1.5 and 3 cm.

Joceline S. Liu, et al. (2018)²⁵ reported the long-term outcomes of urethroplasty using abdominal wall skin (AWS) grafts. Mean stricture length 5.6 cm (1–24 cm).

Col. D.K. Jain, Wg. Cdr. R. Talwar (2007)²⁶ in their study of 12 patients, the mean length of stricture was 10.1 cm (range 6–18 cm).

In our study mean operating time was 176.5 min.

Acimovic et al. (2015)²⁷ The mean operative time was significantly longer in the dorsal onlay urethroplasty group (205 ± 19.63 min) than in the dorsal inlay urethroplasty group (128 ± 4.9 min, P-value <0.0001).

Aldaquadossi H et al. (2014)²⁸ The mean operative time was significantly shorter in the BMG group (155 ± 6.2 min) than in the PSF group (218.5 ± 15.1 min) (p < 0.001).

In our study post-operative Qmax was 19.2 ml/s.

Col. D.K. Jain, Wg. Cdr. R. Talwar (2007)²⁶ in their study of 12 patients, post-operative mean maximum urinary flow rate was 18.1 ml/s.

Acimovic et al. (2015)²⁷ The Qmax was improved in the BMG group from an average of 8.6 ml/s preoperatively to 22.3 ml/s postoperatively, while in the PSF group the Qmax increased from an average of 9.3 ml/s preoperatively to 23.3 ml/s postoperatively.

Soliman MG et al. (2014)²⁹ The mean post-operative Qmax was 18.2 (range 15.8–21.2) (at 9 month).

In our study post-operative complications were divided into early and late complications. In early complications 8 patients had wound infection, 4 had seroma collection and 4 had hematoma formation. Among late complications, 7 had urethrocutaneous fistula formation, 6 had recurrence of stricture, 5 had erectile dysfunction. In buccal mucosa graft harvesting complications like perioral numbness, increased salivation were noted. Perioral numbness occurred in 3 patients and increased salivation occurred in 2 patients. In flank skin graft harvesting, stitchline infection at harvesting site was noted in 2 patients.

Dubey D. et al. (2005)³⁰ In their study, to retrospectively compare the outcome of various techniques of substitution urethroplasty, between 1989 and 2000, 109 patients (mean age 39.5 years) underwent substitution urethroplasty for recurrent ant Ventral onlay repairs were associated with a higher incidence of complications than dorsal repairs, e.g. postvoid dribbling (39% vs 23%, P = 0.01), ejaculatory dysfunction (20% vs 5%, P = 0.03) and flap/graft pseudo-diverticulum or out-pouching (26% vs 2.6%, P = 0.01). Superficial penile skin necrosis was significantly more common with the use of penile skin flaps than with free grafts.

Soliman MG et al. (2014)²⁹ In the BMG group in the study reported here, six patients (31.6%) had minor oral complications: three complained of perioral numbness and another three had increased salivation. All patients recovered within 1 month. Similarly, **Dubey et al.40** reported that 25.7% in the BMG group had minor oral morbidity. A total of 21 men underwent urethroplasty for strictures of an average of 11 cm (range 4 to 24) using abdominal wall skin.

Meeks JJ et al. (2010)³¹ Complications included hair from the skin graft during the early part of the series (14.5%), glans dehiscence (9.5%), urethrocutaneous fistula (9.5%) and periurethral abscess (1 patient).

SUCCESS RATE:

In our study, buccal mucosal graft has success rate of 80% and flank skin graft has success rate of 68%.

CONCLUSION:

The present study included 50 patients of long (>2.5cm) anterior urethral stricture who were admitted to the urology unit of P.G. Department of Surgery, SRN Hospital, MLN Medical College from September 2018 to August 2019.

The conclusions drawn from this study are as follows :

1. Most common age group of long anterior urethral stricture occurs in age group 31–40 yrs.
2. Most common etiology of urethral stricture is of inflammatory origin.
3. Buccal mucosa graft is an excellent graft material for substitution-free graft arthroplasty in case of long anterior stricture with success rate of 80% in this study.
4. Wound infection is the most common early complication and fistula formation is the most common late complication encountered in our study.
5. Flank skin graft i.e. lateral abdominal wall skin graft are an alternative graft source for men with extensive or recurrent urethral stricture with advantages of a large continuous area of graft, limited donor site morbidity, extragenital origin of the skin, and avoidance of extensive oral mucosa graft. Although lateral abdominal wall skin graft remains an option in these patients it may be associated with high recurrence risk.

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