

A study of early experience with the use of buccal mucosa for substitution urethroplasty



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ABSTRACT

Background: The long-term results of internal urethrotomy are poor in stricture urethra. It requires repeated procedures followed up with repeated dilatation. Suprechko in 1886, was the first to describe the use of buccal mucosal graft (BMG). The new technique of dorsal on-lay graft Urethroplasty described by Barbagli in 1995, has been greeted with great amount of enthusiasm through the world. **Aims and Objectives:** The aim of the study is to evaluate the efficacy of buccal mucosa graft in stricture urethra at our centre. The main objective of this study is to assess early complications in buccal mucosal Urethroplasty. **Materials and Methods:** It is a prospective study conducted at Stanley medical college, Chennai from October 2011 to February 2013. A total of 13 patients were enrolled in the study. **Results:** Out of 13 patients, 9 patients underwent dorsal on-lay BMG. 3 patients underwent dorsal on-lay + ventral meatotomy. 2 patients underwent dorsal on-lay + meatoplasty. Only two patients developed immediate post-operative wound infection. One patient developed 1 cm penile skin necrosis at ventral aspect of penis. None of the patient developed significant complications. **Conclusion:** Dorsal on-lay is the preferred form of graft placement. BMG is the ideal substitute for urethra, especially in medium length urethral stricture. Oral cavity donor site had no significant complications. Failure rate was 15.38%, so dorsal on lay technique is ideal for urethral stricture with longer follow up required.

Key words: Stricture urethra; Balanitis xerotica obliterans; Buccal mucosa; AUG; Uroflowmetry; Dorsal on lay; Ventral on lay; Urethroplasty

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INTRODUCTION

Stricture most commonly affects the anterior urethra. The most common causes are balanitis xerotica obliterans (BXO), post gonococcal strictures, Post-endo urological surgery (ischemia was the most common reason to produce stricture), blunt trauma to perineal area leading to healing of injury with scarring is a common cause, failure of hypospadias repair, congenital anomalies affecting the mucosal membrane of bulbar urethra can also produce stricture.^{1,2} Infective/inflammatory process then subsequently extends into the corpus spongiosum. In stricture urethra both the upper urinary system and lower urinary tract system are affected, obstruction also gives rise to secondary infection very commonly.

Internal Urethrotomy and dilatation have some good results only during the initial management of stricture urethra.¹ On long term follow up these two have high failure rates. Use of these procedures for multiple strictures, long strictures and strictures of penile urethra are associated with a very poor success rate. Hence, best method of management in urethral stricture disease is Urethroplasty.

Dubey et al.,² have made a review about their management of BXO by single stage or multi stage procedures. Recurrent stricture was noted in 21.4% of their two stage of Urethroplasty patients and in 12% of single stage Urethroplasty patients. Graft substances, such as skin and bladder mucosa, have been previously used for urethral

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replacement when local epithelial tissue was not available³ Pansadoro et al.,⁴ on reviewing their 38 staged Urethroplasty patients, found that no patients under went revision of stage I Urethroplasty while 8 underwent revision of stage II of Urethroplasty. He concluded by saying, “II stage Urethroplasty is often converted into multi stage procedure.”

Aims and objectives

The aim of the study is to evaluate the efficacy of buccal mucosa graft in stricture urethra at our centre. The main objective of this study is to assess early complications in buccal mucosal Urethroplasty.

MATERIALS AND METHODS

Study design

It is a prospective study conducted from October 2011 to February 2013. A total of 13 patients were enrolled in the study.

Study place

The study was conducted at Stanley medical college, Chennai.

Data analysis

Statistical Data analysis was done using Microsoft Excel (2019) software.

Ethics approval and consent to participate

The study protocol was approved by the institutional ethics committee, and all patients provided written informed consent before enrolment.

Inclusion criteria

Inclusion criteria were as follow; Adult subjects who had Strictures >2 cm involving anterior urethra. The majority of patients presented between 31 and 40 years of age (total 4 patients). The age group of 51–60 patients were evaluated for comorbidities like Hypertension, Diabetes Mellitus, and Ischemic Heart disease admitted in Stanley Medical college, were included in the study.

Exclusion criteria

Exclusion criteria were as follow; Patients with severe oral cavity infection, mucosal ulceration, mucosal fibrosis, Patients with history of erythroplakia, leucoplakia or other pre-malignant conditions or taken treatments in the past for the same were excluded.

RESULTS

According to the aetiology, BXO was the most common cause of the stricture (n=53.84%), second most

common cause was post inflammatory (n=38.46%) and next common was post-surgery stricture (n=7.6%). Accordingly, 9 patients with BXO changes underwent Dorsal on lay BMG Urethroplasty (n=69.2%). For the 3 cases associated with BXO changes with meatal narrowing, Dorsal on lay BMG+ventral meatotomy (n=23.07%) was done. For 1 patient with BXO changes and pin hole meatus, underwent Dorsal on lay BMG+meatoplasty (n=7.6%). Of all the patients, there were 6 patients with 2–7 cm urethral stricture (n=46.15%), 2 patients had 8–10 cm length stricture (n=15.38%), total of 5 patients had more than 11 cm length stricture (n=36.46%), respectively (Tables 1-3). The length of the stricture was assessed on table and accordingly, graft length was chosen (Figures 1 and 2 shows the length of buccal mucosa taken, Figure 3 shows the graft placed over the corporal bed respectively.

Only 2 patients developed immediate post-operative wound infection. One patient developed 1 cm penile skin necrosis at ventral aspect of penis. Another patient developed wound infection at suture site with development of a small sinus, but no urinary leak. This patient had delayed catheter removal after 6 weeks. In both cases, wound infection settled. Peri-catheter study was normal. Of the 13 patients in the study, double cheek graft was taken from 3 patients. None of the patient developed significant complications. One patient was lost follow up at 6 months (n=7.6%). AUG was needed in 2 patients as they clinically had obstructive LUTS symptoms (n=15.12%). In one patient uroflow showed obstructive pattern (n=7.6%) and in another patient uroflow was normal (n=7.6%). In both, AUG was

Table 1: Etiology

S. No.	Etiology	No of patients (%)
1	BXO	7 (n=53.84)
2	Post inflammatory	5 (n=38.46)
3	Post-surgery (Urethrotomy and stone retrieval)	1 (n=7.6)

Table 2: Operative procedures

S. No.	Operative procedures	No of patients (%)
1	Dorsal onlay BMG only	9 (n=69.2)
2	Dorsal onlay BMG+Ventral meatotomy	3 (n=23.07)
3	Dorsal onlay BMG+Meatoplasty	1 (n=7.6)

Table 3: Length of strictures

S. No.	Length of strictures	No of patients (%)
1	2–7 cm	6 (n=46.15)
2	8–10 cm	2 (n=15.38)
3	≥11 cm	5 (n=38.46)



Figure 1: Marking of buccal mucosa graft pictures shows after harvesting buccal mucosa graft

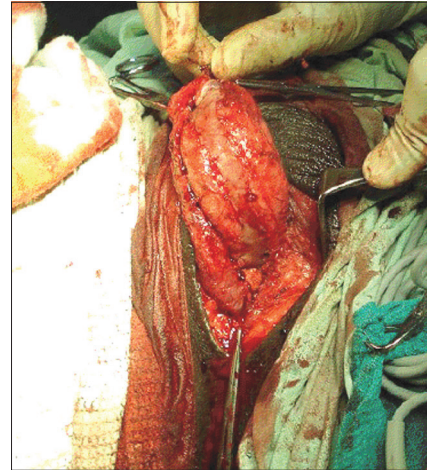


Figure 3: The graft is sutured over the corporal bed

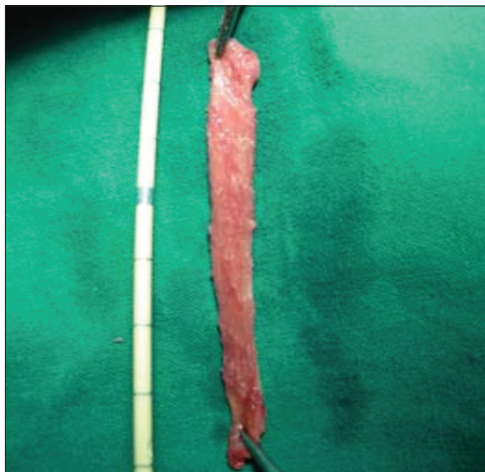


Figure 2: Harvested buccal mucosa Graft

done. AUG was normal in one patient and in another AUG showed sub-meatal stenosis. Subsequently, regular dilatation (n=7.6%) and meatal dilatation was done (n=7.6%) respectively (Table 4).

Post-operative Uroflowmetry was performed for all the patients with stricture <10 cm and >10 cm. Among all of them peak flow, average flow and voided volume were normal immediately after catheter removal, 3rd month and 6th month respectively (Tables 5 and 6). Our study was compared with the study by Dubey et al., and Duckett et al., Pan urethral stricture was seen in 4 (n=30.76%) and stricture of the bulbar urethra in 2 (n=15.38%) of the patients. Failure was noted only in 2 cases at a follow up of 3–6 months. Further follow up is required in our study, to better delineate the outcome (Table 7). Compared with Pansadoro et al., and Christopher et al., our series had lesser number of patients and fewer months of follow up (Table 8).

Table 4: Follow-up at 6 months		
S. No.	Total no of patients	Number of patients
1	Lost follow up	1 (n=7.6%)
2	Follow up	12 (n=92.30%)
3	AUG needed	2 (n=15.38%)
4	Regular dilatation	1 (n=7.6%)
5	Meatal dilatation	1 (n=7.6%)

DISCUSSION

In most cases of stricture, there is no direct relation between an infective source and trauma to urethra. Normally the epithelium of the urethra is of pseudo stratified columnar type. In patients with stricture, this epithelial type changes to columnar type.⁵ This columnar epithelium does not have tight water proofing quality. As a result, extravasation of urine can occur in this type of epithelium. This repeated extravasation of urine causes the urethral fibrosis. Partial loss of urethral lining is also an important factor predisposing to stricture formation. Various methods to manage stricture disease have been reviewed. Internal urethrotomy and dilatation have some good results only during the 1st time management of stricture.⁵ On long term follow up these two have high failure rates. Subsequent second and third procedures had high immediate failure rates.⁵ Use of these procedures for multiple strictures, long strictures and strictures of penile urethra are associated with a very poor success rate. Various procedures have been attempted to improve results of stricture disease. These include laser urethrotomy, and use of urethral stents.⁶ Results decline with time. As a result, recurrence of stricture is common. Hence, best method of management in urethral stricture disease is Urethroplasty.⁶

Other medical managements include - appropriate antibiotic therapy (ceftriaxone) provides good results in gonococcal infection. For chlamydial urethral infection, doxycycline

Table 5: Post Operative follow up uroflow less than 10 cm stricture repair

S. No.	Time of uroflowmetry	Peak flow	Average flow	Voided volume
1	Uroflow after catheter removal	28.8 mL/s	19.75mL/s	278 mL
2	At 3 rd month follow up	21.5 mL/s	15.25 mL/s	287 mL
3	On 6 th month follow up	17.62 mL/s	12.75 mL/s	283 mL

Table 6: Post-operative follow-up uroflow more than 10 cm stricture repair

S. No.	Time of uroflowmetry	Peak flow	Average flow	Voided volume
1	Uroflow after catheter removal	23.8 mL/s	15.6 mL/s	278 mL
2	At 3 rd month follow up	18.2 mL/s	13.8 mL/s	235 mL
3	On 6 th month follow up	17.75 mL/s	15.5 mL/s	288 mL

Table 7: Comparison study of past urethral stricture

Variables	Dubey et al. ²	Ducket et al. ³	Our study
No of patients	25	2	7 (53.84%)
Meatal peno-bulbar stricture	4	2	2 (15.38%)
Pan urethral stricture	21	0	4 (30.76%)
Failure	3	1	2
Follow up months	3–52	6–84	3–6 months

Table 8: Comparison study of medium bulbar stricture

Variables	Pansadoro et al. ⁴	Christopher et al.	Our study
No of patients	23	25	6
Success	23	24	6
Failure	0	1	0
Follow up months	3–50	41–100	3–6 months

Table 9: Surgery of stricture urethra

Length of stricture	Type of procedure
1–2 cm bulbar urethral stricture	End – End urethroplasty
2–3 cm	Augmented roof top anastomotic urethroplasty
3–6 cm	Augmented dorsal or ventral on lay urethroplasty
>6 cm	Staged urethroplasty

gives the best results. Treatment of acute infection does not necessarily prevent the future development of urethral stricture. But if antibiotic treatment is started early, good results can be expected. Steroids like Clobetasol 0.05% is applied locally twice a day for a minimum of 6–8 weeks.⁶ Intra urethral triamcinolone can be used after internal urethrotomy. But long term results are not good. Buccal mucosal epithelium has higher amount of elastin content, so it is durable and easy to use in surgical procedures.⁶ Buccal mucosal lamina propria is a very thin layer. This character is very useful in inosculation and new vessel formation after surgical graft. It has a pan laminar plexus which is thinner in nature. This physical characteristic is

based mainly on the deeper laminal layer. High amount of type IV collagen content, helps in good graft take. It has high capillary density, with wet epithelial surface.⁷ It is a better substitute in case of BXO. Harvesting of BMG is easy and it is also easy to apply, also large volume is available, without any visible scar or deformity.⁷ Graft contracture is <10% and resistant to infection.⁸ Resistant to progression of skin diseases like BXO.⁹ Overall, based on the length of stricture (1–2 cm) End-End Urethroplasty, (2–3 cm) Augmented roof top anastomotic Urethroplasty, (3–6 cm) Augmented dorsal or ventral on lay Urethroplasty,¹⁰ (>6 cm) Staged Urethroplasty shall be planned respectively (Table 9).

Limitations of the study

1. It is not an RCT
2. Long term follow up is required.
3. More number of recurrent stricture urethra patients has to be included in the study

CONCLUSION

Dorsal on-lay is the preferred form of graft placement. BMG is the ideal substitute for urethra, in the management of stricture urethra.¹¹⁻¹³

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Authors' Contributions:

RM - Interpreted the results; reviewed the literature and manuscript preparation; **PP** - Concept, coordination, interpretation and publication work; **JN**- Concept and design of the study, prepared first draft of manuscript; **KV**- Data collection, statistical analysis, preparation of manuscript.

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