

A COMPARATIVE STUDY OF DORSAL VERSUS VENTRAL ONLAY BUCCAL MUCOSAL GRAFT URETHROPLASTY FOR LONG SEGMENT BULBAR URETHRAL STRICTURE

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Abstract

Background: To compare dorsal versus ventral Onlay buccal mucosal graft urethroplasty for long segment bulbar urethral stricture. **Materials and Methods:** A total of 40 patients with long segment (> 2 cms in length) incomplete stricture of bulbar urethra, requiring buccal mucosal graft onlay urethroplasty were selected and were divided into two groups as group A: Dorsal onlay buccal mucosal graft urethroplasty and group B: Ventral onlay buccal mucosal graft urethroplasty. Parameters such as distribution of etiology among both the study groups, length of stricture, operating time, functional status using Q max and other uroflowmetry parameters and postoperative complications were recorded. **Result:** The mean post operative days among group A and B are 5.45 ± 1.61 days and 4.35 ± 1.31 days respectively. Among 20 cases in group A, 20% were iatrogenic, 40% were idiopathic, 25% were inflammatory and 25% were traumatic based on etiology. Among 20 cases in group B, 20% were iatrogenic, 40% were idiopathic, 30% were inflammatory and 10% were traumatic based on etiology. The mean duration of surgery among group A and B were 121.15 minutes and 109.05 minutes and this difference was statistically significant ($p < 0.001$). The mean blood loss among Group A and B were 115.70 ml and 117.65 ml. The mean caliber among Group A and B were 7 fr and 6.75 fr. The mean stricture length among Group A and B were 4.38 cm and 4.10 cm. The mean mucosa harvested among Group A and B were 5.50 cm and 4.95 cm. Among 20 cases of group A, 15% had post operative infection and among 20 cases of group B, 10% had post operative infection. There was no significant difference between post operative infections among the two groups. **Conclusion:** Regarding dorsal Onlay and ventral Onlay buccal mucosal graft urethroplasty (BMGU); both shows good success rate and lower rate of complication in the treatment of long segment incomplete bulbar urethral stricture. Both the procedures have nearly equal success rate.

INTRODUCTION

Stricture of urethra is one of the common diseases, especially among elderly population. It is defined as fixed anatomical narrowing of urethra so that the lumen does not allow urethral instrumentation.^[1] It is generally associated with scarring process involving corpus spongiosum. As high as 0.6% of male in some high risk populations suffer with stricture urethra disease. Nearly more than 6,000 patients with stricture disease visits hospital annually in US. Bulbar urethra is the most commonly affected site by

strictures and accounts for approximately 45% of the cases.^[2]

Although bulbar urethral strictures may be a consequence of instrumentation or infection especially sexually transmitted diseases like Chlamydia, gonorrhea, the most of the cases are idiopathic.^[3] Idiopathic urethral strictures refer to those where no specific inciting factors are identified as a cause of stricture. Iatrogenic stricture can be the result of urethral instrumentation, history of TURP and history of failed hypospadias or epispadias repair. In the posterior urethra cause is mainly

distraction injuries due to pelvic fracture. As the aetiology of anterior and posterior urethra differs, same thing reflects in the surgical management of those strictures.

Currently, several surgical methods do exist for repair of bulbar urethral stricture, the choice of the optimal treatment options largely depends on the exact length of stricture, the density of the spongiofibrosis, and surgeon's experience.^[4] Open urethroplasty has become the gold standard for definitive treatment of urethral strictures. It demonstrates a high success rate (upto95%) compared to alternative treatments such as optical internal urethrotomy (OIU) and urethral dilatation, both of which show long-term recurrence rates of over 50%.^[5] For the reconstruction of long segment bulbar strictures (>2 cm size) the buccal mucosal graft urethroplasty is now accepted as the procedure of choice because of its smooth learning curve, with good results. Buccal mucosal graft can be put by ventral onlay, dorsal onlay and lateral onlay and/or combined technique, but none of these is considered ideal.^[6] In our study we compared the outcomes of ventral onlay and dorsal onlay buccal mucosal graft urethroplasty (BMGU) for long segment bulbar urethral strictures (>2 cm length) In a tertiary hospital.

MATERIALS AND METHODS

This is a prospective observational study of 2 years from January 2020 to December 2021. This study was conducted at the Urology Department, King George Hospital, Andhra Medical College, Visakhapatnam. A total of 40 patients with long segment (> 2 cms in length) incomplete stricture of bulbar urethra, requiring buccal mucosal graft onlay urethroplasty were selected and were assessed during the study period. Prior Permission was taken from the institutional ethics committee, Andhra Medical College, Visakhapatnam. Written and informed consent was taken from every individual of the study. Inclusion criteria was adult males (more than 18 years of age) with clinical and radiological evidence of long segment (>2cms) bulbar urethral stricture as a result of iatrogenic, traumatic, inflammatory or unknown causes and those who give consent to participate in the study. Exclusion criteria was patients with age less than 18 years, patients with bleeding diathesis, patients taking anticoagulant drugs, patient unfit for surgery under anesthesia, history of previous urethroplasty, active urinary tract infection, malignant stricture disease and patients not giving written consent.

A total 40 patients were divided into two groups as group A: Dorsal onlay buccal mucosal graft urethroplasty and group B: Ventral onlay buccal mucosal graft urethroplasty. General identification data of all the participants (Name, age, address, date of admission and phone number) were documented for the purpose of record keeping and patient identity.

An elaborate study of all the patients regarding history of onset of symptoms (aetiology of urethral stricture), duration and progression of symptoms was documented. Patients were asked in details regarding past medical and surgical history, family history, occupational history, socioeconomic status. General physical examination, local examination (presence of phimosis, Meatal stenosis, Balanitis xerotica obliterance, hypospadias, presence of chordee) and systemic examination (including oral examination) were done for all the patients. Ultrasonography of KUB region with prostate volume and post void residual urine (PVRU) and pre operative uroflowmetry (to determine flow pattern) was done for all the patients. Other radiological investigations like micturating cystourethrogram (MCU) and retrograde

Urethrogram (RGU) were done to know the length and location of stricture and to confirm that stricture was incomplete in nature. Intraoperative evaluation consisted of recording the operative details like the duration of surgery, average blood loss during the procedure, exact length and location of stricture segment and calibre of urethra. Length of buccal mucosa harvested was recorded. Any intraoperative and early post operative complications were noted.

Dorsal onlay buccal mucosal graft urethroplasty was done in Group A. Ventral onlay buccal mucosal graft urethroplasty was done in Group B. Parameters such as distribution of etiology among both the study groups, length of stricture, operating time, functional status using Q max and other uroflowmetry parameters and postoperative complications were recorded. After surgery, patients were discharged from the hospital with per urethral catheter and suprapubic catheter in-place. The suture was removed on postoperative day 8 in most of the cases. Catheter was removed after 3-4 weeks depending on wound status. All the patients were followed at 1, 3, 6 months postoperatively for subjective improvements. In case of suspected restricture, retrograde urethrography and cystourethroscopy will be performed at 3 and 6 months. Stricture recurrence is defined as the need for subsequent urethrotomy or urethroplasty during the follow-up period. The data was compiled and subjected to statistical analysis using Statistical Package for Social Sciences (SPSS) package [Stata, version 23.0 SPSS INC, Chicago, IL, USA]. P value less than 0.05 was set significant.

RESULTS

The mean age of the subjects in group A and B are 52.10 ± 10.63 years and 52.80 ± 12.61 years respectively. This difference was not statistically significant. Majority of the cases were in age group of 41 to 50 years in group A and in 41 to 50 and more than 60 years in group B. The difference was non-significant ($P > 0.05$). [Table 1]

The mean post operative days among group A and B are 5.45 ± 1.61 days and 4.35 ± 1.31 days

respectively. The difference between the mean post operative days was statistically significant. [Table 2] Among 20 cases in group A, 20% were iatrogenic, 40% were idiopathic, 25% were inflammatory and 25% were traumatic based on etiology. Among 20 cases in group B, 20% were iatrogenic, 40% were idiopathic, 30% were inflammatory and 10% were traumatic based on etiology. There was no significant difference between the proportions among the two groups. [Table 3]

The mean duration of surgery among group A and B were 121.15 minutes and 109.05 minutes and this difference was statistically significant ($p < 0.001$). The mean blood loss among Group A and B were 115.70 ml and 117.65 ml. The mean caliber among Group A and B were 7 fr and 6.75 fr. The mean stricture length among Group A and B were 4.38 cm and 4.10 cm. The mean mucosa harvested among Group A and B were 5.50 cm and 4.95 cm. [Table 4]

In group A, the baseline creatinine was 1.01 which improved to 0.87 at 3 months and 1.04 at 6 months.

In group B, the baseline creatinine was 0.94 which improved to 0.91 at 3 months and 0.89 at 6 months. There was no significant change in the improvement rates among both the groups. [Table 5]

The Qmax at baseline in group A was 7.70 which improved to 19.97 at 3 months and 19.05 at 6 months. The percentage improvement was 61.44% at 3 months and 59.55% at 6 months from the baseline. The Qmax at baseline in group B was 8.52 which improved to 20.47 at 3 months and 19.61 at 6 months. The percentage improvement was 58.37% at 3 months and 56.55% at 6 months from the baseline. There was significant difference between the average Q max values at baseline with 3 months and baseline at 6 months among both the groups. [Table 6]

Among 20 cases of group A, 15% had post operative infection and among 20 cases of group B, 10% had post operative infection. There was no significant difference between post operative infections among the two groups. [Table 7]

Table 1: Distribution of the cases by age groups

Age group	Group A		Group B		P value
	Number	%	Number	%	
<30	1	5.00	1	5.00	0.9639
31 to 40	1	5.00	2	10.00	
41 to 50	7	35.00	6	30.00	
51 to 60	6	30.00	5	25.00	
>60	5	25.00	6	30.00	
Total	20	100.00	20	100.00	
Mean	52.10		52.80		0.8505
SD	10.63		12.61		

Table 2: Distribution of the cases by post operative day

Post- operative days	Group A		Group B		P value
	Number	%	Number	%	
<5	12	60.00	17	85.00	0.0421
>5	8	40.00	3	15.00	
Total	20	100.00	20	100.00	
Mean	5.45		4.35		0.0227
SD	1.61		1.31		

Table 3: Distribution of the cases by etiology

Etiology	Group A		Group B		P value
	Number	%	Number	%	
Iatrogenic	4	20.00	4	20.00	0.9617
Idiopathic	8	40.00	8	40.00	
Inflammatory	5	25.00	6	30.00	
Traumatic	3	25.00	2	10.00	
Total	20	100.00	20	100.00	

Table 4: Assessment of parameters

Parameters	Group A		Group B		P value
	Mean	SD	Mean	SD	
Duration of surgery (mins)	121.15	14.91	109.05	12.47	0.0083
Blood loss	115.70	19.59	117.65	15.71	0.7303
Caliber	7.00	1.59	6.75	1.94	0.6586
Stricture length (cm)	4.38	1.34	4.10	1.15	0.4903
Length of mucosa harvested (cm)	5.50	1.31	4.95	1.11	0.1599

Table 5: Distribution of the cases by serum creatinine at baseline, 3 months and 6 months

Serum creatinine	Group A		Group B		P value
	Mean	SD	Mean	SD	
Baseline	1.01	0.25	0.94	0.29	0.4566
3 months	0.87	0.22	0.91	0.24	0.5350

6 months	1.04	0.28	0.89	0.24	0.0780
Baseline Vs. 3 months (p value)	0.6732		0.7832		
Baseline Vs. 6 months (p value)	0.5663		0.8733		

Table 6: Distribution of the cases by Qmax at baseline, 3 months and 6 months

Qmax	Group A		Group B		P value
	Mean	SD	Mean	SD	
Baseline	7.70	1.92	8.52	1.73	0.1648
3 months	19.97	2.21	20.47	2.33	0.4946
6 months	19.05	2.26	19.61	2.35	0.4464
Baseline Vs. 3 months (p value)	<0.001		<0.001		
Baseline Vs. 6 months (p value)	<0.001		<0.001		
Baseline Vs. 3 months (% improvement)	61.44%		58.37%		
Baseline Vs. 6 months (% improvement)	59.55%		56.55%		

Table 7: Distribution of the cases by post operative complications

Post operative complications	Group A		Group B		P value
	Number	%	Number	%	
Haematoma	0	0	0	0	-
Infection	3	15.00	2	10.00	0.6532
Necrosis	0	0	0	0	-
Donor site complications	0	0	0	0	-

DISCUSSION

Urethral stricture disease is one of the most common urologic problems known to mankind. By consensus of WHO conference in 2004, the term stricture is usually limited to anterior urethra.^[7] Significant progress has been made in the management of stricture urethra during the last 60 years which allows many of the complex stricture to be successfully reconstructed in single stage. Once the diagnosis of stricture is made next step is to determine if treatment is to be curative or palliative.^[8] The surgeon should have a good knowledge of the role of endoscopic and radiological evaluations in the management of stricture urethra. The surgeon and patient should have a good understanding of the goal of treatment before the treatment choice is made. Several surgical options are available for the management of stricture urethra at present.^[9] All the available options with possible outcomes should be discussed with the patient preoperatively. Some patient may choose to have periodic urethral dilation rather than undergo open surgery.^[10] Though success rate of primary end-to-end anastomotic urethroplasty (EEAU) has the highest but it is generally feasible in comparatively short segment urethral strictures.

With this background the present study was undertaken as a prospective study to compare dorsal versus ventral onlay buccal mucosal graft urethroplasty for bulbar urethral strictures. We compared the results (both preoperative and postoperative Q max), preoperative and post operative serum creatinine, operative time, short and long term complications and recurrence rates among patients undergoing ventral and dorsal onlay BMGU. Our patients in both the groups were comparable in age, aetiology, site of stricture, mean stricture length, post operative complications and median follow up duration. Thus, the major variables that can influence the outcomes of urethroplasty were comparable. In our study, the mean age of the subjects in group A

and B are 52.10 ± 10.63 years and 52.80 ± 12.61 years respectively. Mean age of the patients in our study was more than that in study by Kane et al.^[11] The mean post operative days among group A and B are 5.45 ± 1.61 days and 4.35 ± 1.31 days respectively. Among 20 cases in group A, 20% were iatrogenic, 40% were idiopathic, 25% were inflammatory and 25% were traumatic based on etiology. Among 20 cases in group B, 20% were iatrogenic, 40% were idiopathic, 30% were inflammatory and 10% were traumatic based on etiology.

We observed that among 20 cases in group A, 20% were iatrogenic, 40% were idiopathic, 25% were inflammatory and 25% were traumatic based on etiology. Among 20 cases in group B, 20% were iatrogenic, 40% were idiopathic, 30% were inflammatory and 10% were traumatic based on etiology. We found that the mean duration of surgery among group A and B were 121.15 minutes and 109.05 minutes and this difference was statistically significant ($p < 0.001$). The mean blood loss among Group A and B were 115.70 ml and 117.65 ml. The mean caliber among Group A and B were 7 fr and 6.75 fr. The mean stricture length among Group A and B were 4.38 cm and 4.10 cm. The mean mucosa harvested among Group A and B were 5.50 cm and 4.95 cm. In another study by Gupta et al,^[12] reported in 2004, 12 patients were treated by BMGU. The mean stricture length was 5 cms and mean follow-up period was twelve months. The outcomes were good in eleven (91.7%) out of twelve patients. So in our study we found a slightly lower mean stricture length than in previous studies. Also, our follow-up period is less compared to those of Barbagli et al,^[13] and Gupta et al.^[12] However, all patients in our study were followed up for 6 months as per study protocol. The overall success rate of our study (100%) is better than that of previous studies (92% by Barbagli et al¹³, 91.7% by Asopa et al,^[14] and 91.7% by Gupta et al¹²). However, some other differences do exist

between our study and previously reported studies. First of all, follow up period was less compared to previous study because of covid 19 restriction. We used the surgical technique of Barbagli for dorsal onlay BMG urethroplasty whereas Asopa et al,^[14] used ventral sagittal urethrotomy technique and Gupta et al,^[12] used combinations of ventral sagittal urethrotomy and minimal access perineal approach. In group A, the baseline creatinine was 1.01 which improved to 0.87 at 3 months and 1.04 at 6 months. In group B, the baseline creatinine was 0.94 which improved to 0.91 at 3 months and 0.89 at 6 months. The Qmax at baseline in group A was 7.70 which improved to 19.97 at 3 months and 19.05 at 6 months. The percentage improvement was 61.44% at 3 months and 59.55% at 6 months from the baseline. The Qmax at baseline in group B was 8.52 which improved to 20.47 at 3 months and 19.61 at 6 months. The percentage improvement was 58.37% at 3 months and 56.55% at 6 months from the baseline. Among 20 cases of group A, 15% had post operative infection and among 20 cases of group B, 10% had post operative infection. We found a lower improvement in Qmax compared to the study by Kane et al,^[11] but in both the studies the post-operative symptom scores were in the “mild” range. The follow-up period in our study was 6 months as per protocol while the follow-up period in previous studies was longer which may be because of the fact that those were retrospective studies and because of ongoing covid 19 pandemic duration of follow up is less in our study. Mean stricture length and mean graft length in our study were comparable to that in the previous studies.

CONCLUSION

Onlay graft/flap procedures are associated with greater success rate compared to tubularised grafts. Regarding dorsal Onlay and ventral Onlay buccal mucosal graft urethroplasty (BMGU); both shows good success rate and lower rate of complication in

the treatment of long segment incomplete bulbar urethral stricture. Both the procedures have nearly equal success rate. The choice of surgical approach between both the procedures depends upon the expertise and choice of the surgeon.

REFERENCES

1. Santucci RA, Joyce GF, Wise M. Male urethral stricture disease. *J Urol* 2007;177:1667–74.
2. Palminteri E, Berdondini E, Verze P et al (2013) Contemporary urethral stricture characteristics in the developed world. *Urology* 81:191–196.
3. Mundy AR, Andrich DE (2011) Urethral strictures. *BJU Int* 107:6–26.
4. Hampson LA, McAninch JW, Breyer BN (2014) Male urethral strictures and their management. *Nat Rev Urol* 11:43–50.
5. McAninch JW. Fasciocutaneous penile flap reconstruction of complex anterior urethral strictures. In: McAninch JW, editor. *Traumatic and reconstructive urology*. Philadelphia: W.B. Saunders; 1996. p. 609–13.
6. Waxman SW, Morey AF. Management of urethral strictures. *Lancet* 2006;367(9520):1379–80.
7. Singh O, Gupta SS, Arvind NK. Anterior urethral strictures: a brief review of the current surgical treatment. *Urologia Internationalis* 2011;86(1):1–10.
8. Kessler TM, Schreiter F, Kralidis G, Heitz M, Olanas R and Fisch M: Long-term results of surgery for urethral stricture: a statistical analysis. *J Urol*. 2003;170:840–44.
9. Humby G. A one-stage operation for hypospadias repair. *Br J Surg*. 1941;29:84–92.
10. Wessells H and McAninch JW: Use of free grafts in urethral stricture reconstruction. *J Urol* 1996;155:1912–15.
11. Kane CJ, Tarman GJ, Summerton DJ, Buchmann CE, Ward JF, O’Reilly KJ, Ruiz H, Thrasher JB, and Morey AF: Multi-institutional experience with buccal mucosa onlay urethroplasty for bulbar urethral reconstruction. *J Urol*. 2002; 167:1314–17.
12. Gupta NP, Ansari MS, Dogra PN and Tandon S: Dorsal buccal mucosal graft urethroplasty by a ventral Sagittal urethrotomy and minimal-access perineal approach for anterior urethral stricture. *BJU Int*. 2004; 93: 1287- 90.
13. Barbagli G, Palminteri E and Rizzo M: Dorsal onlay graft urethroplasty using penile skin or buccal mucosa in adult bulbourethral strictures. *J Urol*. 1998; 160: 1307-09.
14. Asopa HS, Garg M, Singhal GG, Singh L, Asopa J, and Nischal A: Dorsal free graft urethroplasty for urethral stricture by ventral sagittal urethrotomy approach. *Urology* 2001; 58:657-59.