

Outcome of Combined Dorsal and Ventral Buccal Mucosal Graft Meatoplasty in Comparison with Dorsal Graft In Meatal Stenosis due to Balanitis Xerotica Obliterans

Mostofa KMI¹, Islam MS², Hassan N³, Alam O⁴, Kabir ASMH⁵, Alam SMM⁶

Article info

Received : 05.01.2023
Accepted : 11.08.2023
No. of Tables : 07
No. of Figure : 02
No. of References : 19

Cite the Article:

Mostofa KMI, Islam MS, Hassan N, Alam O, Kabir ASMH, Alam SMM. Outcome of Combined Dorsal and Ventral Buccal Mucosal Graft Meatoplasty in Comparison With Dorsal Graft In Meatal Stenosis due to Balanitis Xerotica Obliterans. Pabna Med. Col. J. 2023;2(2): 30-35.

Keywords: Balanitis xerotica obliterans (BXO), Buccal Mucosal Graft (BMG), Urethroplasty.

Abstract

Background: Balanitis Xerotica Obliterans (BXO) with meatal stenosis is a very morbid condition. Treatment of meatal stenosis due to balanitis xerotica obliterans is very challenging because of high recurrence rate. Various type of surgical treatment options are practice for BXO with meatal stenosis. Proper treatment is necessary to give a free relief from the sufferings.

Objectives: The purpose of this study was to evaluate the outcome of combined dorsal and ventral buccal mucosal graft meatoplasty with dorsal meatoplasty in the treatment of Balanitis Xerotica Obliterans with meatal stenosis.

Methods: This prospective quasi experimental study was carried out in the department of urology, Dhaka Medical College and Hospital, Dhaka, Bangladesh from July 2013 to June 2015 for a period of twenty four (24) months. All patients presented with Balanitis Xerotica Obliterans with meatal stenosis. Patients were divided into two groups designated as group 1 and group 2 for combined dorsal and ventral buccal mucosal graft meatoplasty and dorsal graft meatoplasty. Post-operative follow up was carried out six months.

Results: Among 60 patients 30 were in group 1 and the rest 30 patients were in group 2. In group 1, the mean $\pm$ SD of operative time was 101.17 ± 16.27 minutes. Six months after in group 1, mean $\pm$ SD of q_{max} was 19.37 ± 4.79 ml/sec and in group 2, mean $\pm$ SD of q_{max} was 16.16 ± 3.69 ml/sec ($p < 0.05$). In group 1, mean $\pm$ SD of voiding time was 29.33 ± 8.16 sec. In Group 2, mean $\pm$ SD of voiding time was 32.73 ± 13.83 ml/sec ($p > 0.05$) in group 1, success was in 25 (83.3%) cases where as in group 2, it was in 19 (63.3%) cases.

Conclusion: However, a prolonged longitudinal follow up is essential for combined dorsal and ventral buccal mucosal graft meatoplasty is better than dorsal graft meatoplasty.

Introduction

Balanitis Xerotica Obliterans (BXO) is a chronic progressive inflammatory dermatological condition of unknown aetiology affecting the male genitalia which can affect the foreskin, frenulum, glans, meatus and urethra. It was first described in 1928 by Stuhmer and is considered as the male genital variant of lichen

sclerosis. The name was derived from the three components of the disease, which are balanitis - chronic inflammation of the glans penis - xerotic - abnormally dry appearance of the lesion and obliterans association of occasional endarteritis¹. The most feared complications of Balanitis Xerotica Obliterans are meatal stenosis and urethral stricture.

1. Dr. Kh Mehedy Ibnay Mostofa, Lecturer, Department of Community Medicine, Pabna Medical College, Bangladesh

2. Dr. Md Sherajul Islam, Assistant Professor, Department of Surgery, Pabna Medical College, Bangladesh

3. Dr. Nazia Hassan, Radiologist, 250 Bedded General Hospital Pabna, Bangladesh

4. Dr. Ohidul Alam, Assistant Professor, Department of Urology, Shaheed Sheikh Abu Naser Specialized Hospital, Bangladesh

5. Dr. A.S.M Humayan Kabir, Assistant Professor, Department of Urology, Kushtia Medical College, Bangladesh

6. Professor Dr. S.M. Mahbub Alam, Professor of Urology, Ex-Head, Department of Urology, Dhaka Medical College, Bangladesh.

Correspondence: Dr. Kh Mehedy Ibnay Mostofa, Lecturer, Department of Community Medicine, Pabna Medical College, Pabna, Bangladesh Email: drmostofamk789@gmail.com, Phone- +880 1797091616

Reported incidence 4%-47% of meatal stenosis and 20%-60% of urethral strictures^{2,3}. Extensive experience shows that in long-standing disease, mucosal involvement and spongiofibrosis can spread proximally as far back as the prostate. Balanitis Xerotica Obliterans has been managed both medically and surgically. Medical treatment can provide useful palliation but is regarded to be limited. The surgical options are more definitive, and include circumcision, dilatation or surgically correction of meatal stenosis and some urethroplasty techniques⁴.

Patient with balanitis xerotica obliterans have significantly higher rate of failure following urethroplasty for distal urethral strictures⁵. Treatment of distal urethral strictures changed in the last decade from dilatation, internal urethrotomy to definitive reconstruction techniques such as penile fasciocutaneous flap urethroplasty and buccal mucosa graft urethroplasty^{6, 7}. Urethral meatal stenosis can be treated by ventral meatotomy or dorsal v-meatoplasty. Meatotomy in balanitis xerotica obliterans is often followed by recurrence. Meatoplasty by buccal mucosal graft produced complete resolution of the disease in their cases⁸. When there is fossa navicularis strictures clinically suspicious for lichen sclerosis, it appears that the use of penile skin for reconstruction increases the likelihood of stricture recurrence. A 100% recurrence rate when penile skin flaps were used with lichen sclerosis compared with only a 6% recurrence rate with oral graft⁵. The use of buccal mucosal graft (BMG) in urethral surgery was first described by humby in 1941, following which it was not reported again until the late 1980s. Since then, it has gained favour as a versatile graft material well suited to repair of the urethra. It is thought to be especially suitable as it is a wet epithelium. It is readily harvested and has been shown to be resistant to recurrence of strictures, especially in the presence of Balanitis Xerotica Obliterans.. Buccal mucosa also has a dense submucosa with a dense capillary network, which facilitates the early imbibition of nutrients from the wound bed as well as early inosculation of neovasculture. Glans penis has a good blood supply providing an efficient graft take⁹.

Currently, buccal mucosa graft substitution urethroplasty is the most preferred option for urethral strictures. Whether to place the graft dorsally, ventrally, or laterally is still controversial. Single

ventral graft is more prone to develop fistula formation, sacculation and diverticula formation leading to urinary stasis and ejaculatory dysfunction¹⁰. Excellent long term results have been reported a successful technique for dorsal placement of buccal mucosa graft in long anterior urethral strictures through a ventral sagittal urethrotomy. The procedure is easier to perform and better because the urethra is not mobilized¹¹. The dorsal buccal mucosal graft meatoplasty, the overall success rate were good (87%)¹². Combined placement of double dorsal and ventral buccal mucosal graft creates a neourethra which is sufficiently wide, stable and maintains axial continuity of the urethral lumen. Their technique is founded on the principle of preservation of the integrity of the urethral plate and its vascularity. This surgical technique allows the partial removal of fibrotic urethral tissues without compromising the adequacy of the urethral lumen, thus adding further to the success¹³.

Recently Goel et al. presented their experience with 10 patients with glandular or meatal strictures treated with double buccal mucosa graft technique. They reported a functional and cosmetic outcome in 100% of patients after a mean follow up of 13.5 months¹⁴. The present study is designed to compare the short term outcome of combined dorsal plus ventral buccal mucosa graft and single (dorsal graft) buccal mucosa graft meatoplasty for meatal stenosis due to Balanitis Xerotica Obliterans.

Materials and methods

It was a prospective study (quasi experimental) carried out department of urology, in Dhaka Medical College and Hospital, Dhaka, Bangladesh during the period of July 2013 to June 2015. Total 60 patients of BXO with meatal stenosis were selected as per inclusion and exclusion criteria. Inclusion criteria were Balanitis Xerotica Obliterans with meatal stenosis, stricture length: 2.0 cm or less than 2.0 cm, age of the patient: 20- 50 years and those who agreed to be included in this study.

Sixty patients were counselled about techniques of buccal mucosal graft meatoplasty and possibility of using one of them. Patients were divided in two groups: group 1 and group 2. Patients in group 1 were treated with combined ventral and dorsal buccal musosal graft meatoplasty and group 2 were treated with dorsal buccal mucosal graft meatoplasty. This study was carried out to evaluate the outcome of

meatoplasty by two different surgical procedures. Sampling was done by purposive sampling technique. Selection of patient was done by inclusion and exclusion criteria. All operated patients followed up as per follow up schedule. The patients were followed up after surgery at 1st, 3rd and 6th month for further evaluation. All data processed manually and analyzed with the help of window based microsoft program IBM SPSS (statistical package for social sciences) version 20.0.

Results

Present study intended to compare the outcome between combined (ventral and dorsal) buccal mucosal graft meatoplasty and dorsal graft meatoplasty of 60 patients of BXO with meatal stenosis and were purposively assigned to combined ventral and dorsal graft meatoplasty (group1, n=30) and dorsal buccal mucosal graft meatoplasty (group 2, n=30). The outcome was evaluated in terms of q_{max} , voiding time, urethrocutaneous fistula, recurrence, findings of RGU and MCU between two groups. Mean stricture length was 1.63 ± 0.18 cm and 1.58 ± 0.17 cm in group 1 and group 2 respectively. There was no significant difference in stricture length between these two groups ($p > 0.05$). Mean duration of operation was 101.17 ± 16.27 minutes and 76.77 ± 10.97 minutes in group 1 and group 2 respectively. There was significant difference in duration of operation between these two groups ($p < 0.05$). At the time of 3rd follow up recurrence was seen in 2 (6.7%) patients and in 8 (26.7%) patients in group 1 and group 2 respectively. There was statistical significant difference between these two groups ($p < 0.05$). Finally in this study, in group 1 success was 25 (83.3%) cases where as in group 2 it was 19 (63.3%) cases. Difference was statistically significant ($p < 0.05$).

Table - I: distribution of patients according to the age.

Age	Group		P value
	Group 1	Group 2	
	(combined graft) N (%)	(dorsal graft) N (%)	
≤30	6 (20.0)	7 (23.3)	0.619
31 – 40	16 (53.3)	17 (56.7)	
41 – 50	8 (26.7)	6 (20.0)	
Total	30 (100.0)	30 (100.0)	
Mean ± sd	36.27 ± 6.40	35.13 ± 6.05	

T test was done to measure the level of significance.

Table II: Distribution of patients according to length of stricture and duration of operation time.

Variables	Group		P value
	Group 1	Group 2	
	(combined graft) N (%)	(dorsal graft) N (%)	
Stricture length (cm)	1.63 ± 0.18	1.58 ± 0.17	0.321
Duration of operation (minutes)	101.17 ± 16.27	76.77 ± 10.97	0.001

Independent t test was done to measure the level of significance.

Table III: Distribution of patients according to voiding time in both groups.

Voiding time (second)	Group		P value
	Group 1	Group 2	
	(combined graft) N (%)	(dorsal graft) N (%)	
Pre operative	137.27 ± 7.36	134.33 ± 4.88	0.074*
1 st follow up	25.93 ± 6.40	27.90 ± 7.80	0.290*
2 nd follow up	27.33 ± 9.71	28.86 ± 11.45	0.578*
3 rd follow up	29.33 ± 8.16	32.73 ± 13.83	0.251*
P value (with in groups between pre operative and 3 rd follow up)	<0.001#	<0.001#	

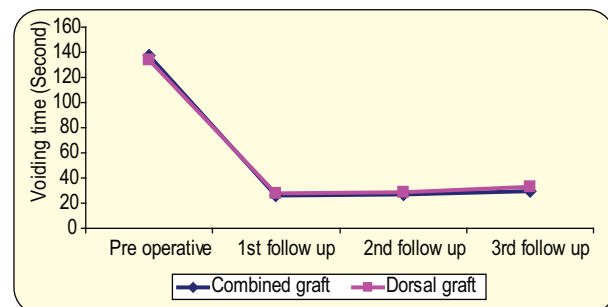


Figure 1: Line diagram showing pre operative and post operative voiding time

Table IV: Distribution of patients according to q_{max} in both groups

Qmax (ml/sec)	Group		P value
	Group 1	Group 2	
	(combined graft) N (%)	(dorsal graft) N (%)	
Pre operation	5.26 ± 1.24	5.74 ± 1.10	0.510*
1 st follow up	23.38 ± 5.25	22.26 ± 4.07	0.360*
2 nd follow up	21.51 ± 5.10	19.85 ± 4.19	0.173*
3 rd follow up	19.37 ± 4.79	16.16 ± 3.69	0.005*
P value (with in groups between pre operative and 3 rd follow up)	<0.001#	<0.001#	

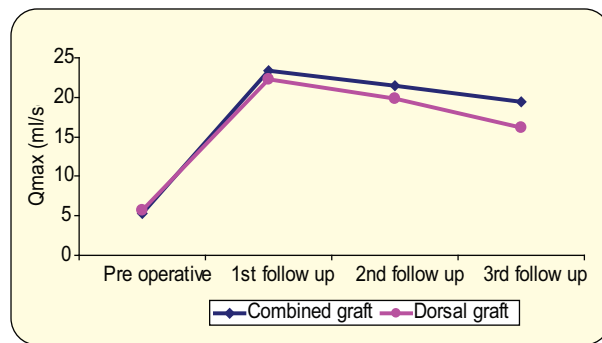


Figure 2: Line diagram showing pre-operative and post-operative $q_{\max}$

Table V: Distribution of patients according to recurrence of meatal stenosis in both groups

Recurrence	Group		P value
	Group 1 (combined graft) N (%)	Group 2 (dorsal graft) N (%)	
1 st follow up	0 (0.0)	2 (6.7)	0.150
2 nd follow up	2 (6.7)	5 (16.7)	0.228
3 rd follow up	2 (6.7)	8 (26.7)	0.035

Chi square test was done to measure the level of significance.

Table VI: distribution of patients according to RGU & MCU findings in both groups

RGU & MCU findings	Group		P value
	Group 1 (combined graft) N (%)	Group 2 (dorsal graft) N (%)	
1 st follow up (narrow)	0 (0.0)	2 (6.7)	0.150
2 nd follow up (narrow)	2 (6.7)	5 (16.7)	0.228
3 rd follow up (narrow)	2 (6.7)	9 (30.0)	0.020

Table VII: Distribution of patients according to final outcome

Final outcome	Group		P value
	Group 1 (combined graft) N (%)	Group 2 (dorsal graft) N (%)	
Success	25 (83.3)	17 (56.7)	
Failure	5 (16.7)	13 (43.3)	
Total	30 (100.0)	30 (100.0)	0.024

Discussion

Balanitis xerotica Obliterans (BXO) with meatal stenosis has been managed by surgically. Meatal stenosis can be treated by ventral meatotomy or dorsal v-meatoplasty or genital flap meatoplasty or non-genital graft meatoplasty. Now the principle of surgical treatment of meatal stenosis in BXO patient is non-genital graft meatoplasty. Among non-genital graft, buccal mucosal graft meatoplasty is most appropriate for meatoplasty in BXO with meatal stenosis. Several techniques are practice such as ventral onlay, dorsal inlay and circumferential graft, combined dorsal and ventral graft meatoplasty. Among reconstruction procedure, ideal surgical techniques for balanitis xerotica obliterans with meatal stenosis is non-genital graft meatoplasty.

The techniques are various and the location of the patch has become a contentious issue with different series reporting buccal mucosal grafts placed either ventrally or dorsally to augment the stricture urethra.^{15,16} Recently palminetri and colleagues have discussed the combined use of both dorsal inlay and ventral onlay of buccal mucosal graft in the management of sever bulbar urethral stricture.

The use of buccal mucosa in urethral surgery was first described by humby in 1941. Since then it has proved to be a versatile graft material well suited to repair the urethra.¹⁷ It is a moist epithelium, which is easily harvested and amenable to surgical manipulation. It has privileged immunity rendering it less prone to infection and is more resistant to stricture recurrence. Buccal mucosa also has dense sub mucosa with a dense capillary network that facilitates the early imbibition of nutrients from the wound bed as well as early inosculation of neovasculature.¹⁸

Over the last decade this graft has become popular for urethral reconstruction and has been associated with excellent outcome.¹⁹

The dorsal graft placement can be performed by Bargbagli method or Asopa technique. Palminetri and colleagues first described the use of a combined ventral and dorsal graft in the bulbar urethra reconstruction. This new approach introduces new concept about the importance of the urethral plate quality and its preservation during bulbar urethroplasty to treat tight and long stricture.

By adopting a combined dorsal and ventral double enlargement of very narrow stricture tracts creating a

neo-urethra sufficiently wide and more stable, reducing the risk of recurrence at distal or proximal graft anastomotic sites.^{13,14}

Usually the dorsal or ventral single graft urethroplasty is performed without resection of any diseased tissues, whereas the double graft enlargement allows the partial removal of the fibrotic urethral tissues without jeopardizing the creation of a wide enough lumen. Furthermore, the dorsal incision aims to release the scarred rings on the urethral plate.

The double patch technique with the inclusion of the residual lateral strips of the urethral plate allows a safer and more stable reconstruction. Avoiding a circumferential anastomosis and preserving the axial continuity of the lumen.¹³

The present work has been carried out to compare the outcome of combined buccal mucosal graft over the only dorsal buccal mucosal graft in the management of BXO with meatal stenosis. A total sixty (60) patients were included, patients underwent combined graft meatoplasty (group=1, n= 30) and patients underwent dorsal buccal mucosal graft meatoplasty (group= 2, n=30). In this study, each sample determined by purposive sampling technique.

In this study, mean ages between two groups were 36.27 ± 6.40 years and 35.13 ± 6.05 years for combined ventral and dorsal buccal mucosal graft meatoplasty, dorsal buccal mucosal graft meatoplasty respectively. In group1 maximum 16 (53.3%) patients and also in group 2, maximum 56.7% patients were in age group 31 – 40 years. There is no significant differences of mean ages between two groups, p value is 0.619 which is >0.05 .

Length of the stricture was determined by retrograde urethrogram (RGU) and micturating cystourethrogram (MCU), all of them were < 2 cm. In combined graft mean stricture length was 1.63 ± 0.18 cm and in dorsal graft was 1.58 ± 0.17 cm. No statistically significant difference was observed between the group i and group ii in terms of length of stricture ($p= 0.321$). The length of the stricture corresponds with the study of Simsek et al; 2014.⁴

Operation time was higher in combined graft meatoplasty due to placement of graft in dorsal and ventral aspect, but in case of dorsal graft meatoplasty only graft placed in dorsal bed. Mean operation time were 101.17 ± 16.27 minutes and 76.77 ± 10.97 minutes respectively group1 and group 2.

In this study, outcome have evaluated on the basis of history and clinical examination, postoperative complication, findings of uroflowmetry (q_{max} , voiding time) and retrograde urethrogram and micturating cystourethrogram.

In terms of preoperative mean voiding time on uroflowmetry in group 1 was 137.27 ± 7.36 seconds and in group 2 was 134.33 ± 4.88 second ($p = 0.074$). But statistically significant difference was present in both groups between preoperative and postoperative q_{max} and voiding time on follow up at 6th month mean q_{max} was better in combined graft meatoplasty group (19.37 ± 4.79 ml/sec) than dorsal meatoplasty group (16.16 ± 3.69 ml/sec). Statistically significant difference was present ($p=0.005$). Voiding time was more in group 2 (32.73 ± 13.83 sec) than group1 (29.33 ± 8.16 sec) but there was no statistically significant difference was present ($p=0.251$).

In this study, in terms of RGU and MCU, the difference between these two groups was not present statistically significant in 1st and 2nd follow up but at the time of 3rd follow up narrow urethra was seen in 6.7% cases and in 30.0% cases in combined dorsal plus ventral BMG graft meatoplasty group and dorsal graft meatoplasty group respectively. Finally statistically significant difference was present between these two groups ($p<0.05$).

Final outcome in this study, in group-1 success was 83.3% cases where as in group- 2 it was 63.3% cases. Difference was statistically significant ($p<0.05$). However, the study is prospective, has limitation of having a short follow-up and lacks comparison with other standard simple buccal graft substitution to document its possible advantages.

References

1. Celis S, Reed F, Murphy F, Adams S, Gillick J, Abdelhafeez AH, Lopez PJ. Balanitis xerotica obliterans in children and adolescents: A literature review and clinical series. *Journal of Pediatric Urology* 2014;10:34-39 .
2. Depasquale I, L., Park, A.J. and Bracka, A. The treatment of balanitis xerotica obliterans. *BJU International* 2000; 86:459 – 465.
3. Pugliese, J.M., Morey, A.F. and Peterson, A.C. Lichen sclerosis: review of the literature and current recommendations for management. *J Urol* 2007;178:2268-76.
4. Simsek A, Sinasi Yavuz Onol, Omer Kurt, »Treatment of urethral strictures in balanitis xerotica obliterans (BXO) using circular buccal mucosal meatoplasty:

- Experience of 15 cases. *Archivio Italiano di Urologia e Andrologia* 2014; 86(1) : 23-25.
5. Venn, S.N. and Mundy A.R. Urethroplasty for balanitis xerotica obliterans. *BJU Int.* 1998;81:735.
 6. Jordan, G.H.. Reconstruction of the fossa navicularis. *J Urol* 1987;138:102-4.
 7. Armenakas, N.A. and McAninch, J.W. Management of fossa navicularis strictures. *Urol Clin North Amr* 2002;29:477-484.
 8. Zungri E, Chéchile G, Algaba F, Mallo N. Balanitis xerotica obliterans: surgical treatment. *Eur Urol* 1988;14:160-162.
 9. Dubey D, Sehgal A, Srivastava A, Mandhani A, Kapoor R, Kumar A. Buccal mucosal urethroplasty for balanitis xerotica obliterans related urethral strictures: the outcome of 1 and 2-stage techniques. *J Urol* 2005;173:463-66.
 10. Bhargava, S. and Chapple, C.R. Buccal mucosal urethroplasty: Is it the new gold standard. *Br J Urol* 2004;93:1191-1193.
 11. Asopa HS, Garg M, Singhal GG, Singh L, Asopa J, Nischal A. Dorsal free graft urethroplasty for urethral stricture by ventral sagittal urethrotomy approach. *J Urol* 2001;58(5) :657-659.
 12. Pisapati VL, Paturi S, Bethu S, Jada S, Chilumu R, Devraj R, Reddy B, Sriramoju V. Dorsal buccal mucosal graft urethroplasty for anterior urethral stricture by Asopa technique. *Eur Urol* 2009; 56(1):201-5.
 13. Palminteri, E., Manzoni, G. and Berdondini, E. Combined dorsal plus ventral double buccal mucosa graft in bulbar urethral reconstruction. *Eur Urol* 2008;53:81-90.
 14. Goel, A., Dalela, D. and Sankhwar, S.N. Meatoplasty using double buccal mucosal graft technique. *Int Urol Nephrol* 2009; 41:885-87.
 15. Barbagli G, Palminteri E, Guazzoni G, Montorsi F, Turini D, Lazzeri M. Bulbar urethroplasty using buccal mucosa grafts placed on the ventral, dorsal or lateral surface of the urethra: are results affected by the surgical technique. *J Urol* 2005; 174(3):955-957.
 16. Pansadoro V, Emiliozzi P, Gaffi M, Scarpone P, DePaula F, Pizzo M. Buccal mucosa urethroplasty in the treatment of bulbar urethral strictures. *J.Urology* 2003; 61(5):1008-10.
 17. Bhargava, S. and Chapple, C.R. Buccal mucosal urethroplasty: Is it the new gold standard. *Br J Urol* 2004; 93:1191-1193.
 18. Andrich, D.E. and Mundy, A.R. Substitution urethroplasty with buccal mucosal free grafts. *Journal of Urology* 2001;165(4):1131-1133
 19. Andrich, D.E., Leach, C.J. and Mundy, A.R. The Barbagli procedure gives the best results for patch urethroplasty of the bulbar urethra. *BJU International* 2001;88: 385-389.