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Original Research Article

Substitution Urethroplasty in the Management of Anterior Urethral Stricture Disease - A Study of 50 Cases

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Abstract

Background: The term urethral stricture refers to anterior urethral narrowing or a scarring process involving the spongy erectile tissue of corpus spongiosum. Urethral stricture is one of the most important causes of bladder out flow obstruction. There are different treatment modalities for the management of stricture urethra. Both the patient and the physician must have a good understanding of the procedure & outcome of treatment. Different types of tissues are standardized by different surgeons. Each type of graft has its own procedural advantage and disadvantage. So it is recommended to select the case for a particular type of graft. But it is evident that judicious use of specific graft has almost equal outcome. ***Aim:*** To see outcome of substitution urethroplasty in the management of long segment anterior stricture disease, to study the improvement of clinical manifestation (poor flow, narrow stream, double stream) following surgical correction of stricture urethra And to see the change in uroflowmetry following surgical correction of stricture urethra, to study the post-operative complication. ***Methodology:*** This study comprises of 50 consecutive cases of anterior urethral stricture who were admitted in department of urology Enam Medical College and Hospital from January 2018 to January 2021. All patients were attended in urology outpatient department. They were worked up properly and previous treatments were thoroughly analyzed. All of them were appropriately treated with reconstruction. The total study population was 50 patients aged 20-50 years. ***Results:*** The total study population was 50 patients aged 20-50 years, 8(16.0%) patients had 20 years to 25 years, 16(32.0%) patients had 26 years to 30 years, 10(20.0%) patients had 31 years to 35 years, 8(16.0%) patients had 36 years to 40 years, 3(6.0%) patients had 41 years to 45 years and 5(10.0%) patients had 46 years to 50 years. Average Mean value of Peak flow rate in first month in 50 patients was 29.78ml/sec. Cystoscopy was done in all patients in 3rd month to see the anastomotic site. After six months of follow up only two patients had complaints of obstructive symptom. Uroflowmetry showed peak flow rate less than 10 ml. Here we did cystoscopic examination. And stricture segment was identified proximal to the previous site which was managed by OIU. After that no such obstructive flow was reported by those patients. Retrograde Urethrogram was done in all the patients to see caliber of urethra. In case two out of 50 showed recurrence in RGU with MCU. Conclusion: This study showed better outcome than any other conventional method for the treatment of stricture urethral disease. So, it can be concluded that substitution urethroplasty is the treatment of choice for the management of long segment anterior urethral disease.

Keywords: Urethroplasty, Anterior, Urethral, Stricture.

INTRODUCTION

The term urethral stricture refers to anterior urethral narrowing or a scarring process involving the corpus spongiosum. Urethral stricture is one of the most important causes of bladder outflow obstruction. There are different treatment modalities for the management of stricture urethra. Both the patient and the physician must have a good understanding of the procedure & outcome of treatment.

Treatment modalities for stricture urethra includes urethral dilation, urethrotomy by otis urethrotome or optical with cold knife or by laser and urethroplasty. Optical urethrotomy with knife or laser ablation are popular and widely used technique to correct stricture [1], but urethral reconstruction or urethroplasty is the ultimate treatment of urethral stricture. Substitution urethroplasty is an outstanding option which preserves the urethral length along with

optimal correction of stricture. It also gives a new horizon for the management of recurrent stricture with better outcome. Anterior urethral stricture requires substitution urethroplasty [2]. Urethral mucosa can be substituted by using penile skin or free grafts of full thickness non hair bearing skin, bladder mucosa or buccal mucosa (BMG) or tunica vaginalis [3]. The BMG is emerging as the most versatile urethral substitute as it has ideal graft characteristics and can easily be harvested with no significant morbidity. There are lot of recommendations suggest that it is the tissue of choice for reconstructing bulbar urethral strictures. It is also the preferred substitute for strictures related to BXO (Balanitis Xerotica Obliterans) as use of penile skin as graft or flap is contraindicated in such cases. Along its success in the bulbar segment, the use of BMG for one stage reconstruction of meatal, pendulous and pan urethral stricture disease have been reported with brilliant success [4]. Different types of tissues are standardized by different surgeons. Each type of graft has its own procedural advantage and disadvantage. So it is recommended to tailor the case for a particular type of graft. But it is evident that judicious use of specific graft has almost equal outcome.

MATERIALS & METHODS

This was a Retrospective study conducted in the Department of Urology of Enam Medical College &Hospital from January 2018 to January 2021. A total of 50 patients having long segment anterior urethral stricture admitted in the Department of Urology, Enam Medical college & Hospital, who underwent either single stage or staged urethroplasty by buccal mucosa or by bladder mucosa were selected by purposive sampling. The patients were evaluated first by detail history, physical examinations and by urinalysis, urine culture and sensitivity, complete blood count (CBC), Ascending and descending urethrography (RGU & MCU). Then selected cases of bulbar stricture urethra or penile stricture or pan urethral strictures that fulfilled the selection criteria were included in this study. The patients were regularly following upped by a standard protocol.

Inclusion criteria

Anterior urethral stricture, recurrent urethral stricture, Stricture length > 1 cm, Age 20-50 yrs

Exclusion criteria

Short segment, soft stricture <1 cm

RESULT

This study comprised of 50 cases of anterior urethral stricture who were admitted in department of urology, Enam Medical College and Hospital from January 2018 to January 2021. They were evaluated by history, physical examination & checking of previous documents. All of them were treated with substitution urethroplasty. Out of 50 patients 40 patients received buccal mucosa as graft whereas 10 received bladder mucosa graft.48% patients were between 20-30 years of age, 36% were between 31 to 40 years and only 16% were between 41 to 50 years. The youngest patient was 23 years old and eldest patient was 48 years old (Table I).

Table-I: Age distribution of the study population (n=50)

Age Distribution (years)	n=50	%
20 to 30 years	24	48%
31 to 40 years	18	36%
41 to 50 years	08	16%
Total	50	100.00

As for aetiology, it was seen that 50% patients had stricture due to inflammatory cause. 16% patients presented with recurrent stricture. 10% were due to traumatic & 10% due to BXO. 14% patients presented with stricture due to unknown aetiology (Table II).

Table-II: Causes of stricture of the study population (n=50)

Etiology of Stricture	n=50	%
Inflammatory	25	50.0
Recurrent	08	16.0
Traumatic	05	10.0
BXO	05	10.0
Idiopathic	07	14.0
Total	50	100.00

All patients presented with poor flow during micturition. But there was association of other feature like acute retention in 16%, interrupted flow in 12% and double stream in 10% cases. 16% patient presented with acute retention where perurethral catheterization was not possible, and underwent suprapubic urinary diversion (Fig. I).

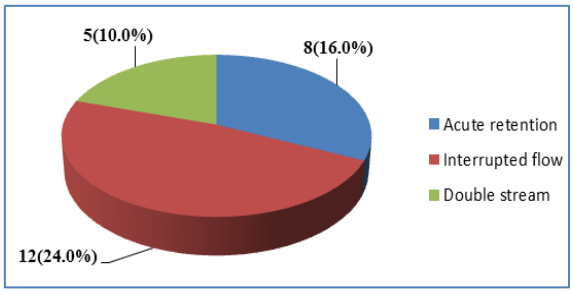

Fig-I: Chief Complaints the study population (n=50)

Table-IV: Site & length of stricture segment

Site of stricture	Length of stricture segment	Mean Value
Bulbar	1-5 cm	3.3 cm
Penile	5 -10 cm	8-6 cm
Penile and bulbar	> 10 cm	11.66 cm

Out of 50 patients, 25 had bulbar urethral stricture, 15 had penile and 10 had panurethral stricture. (Fig II)

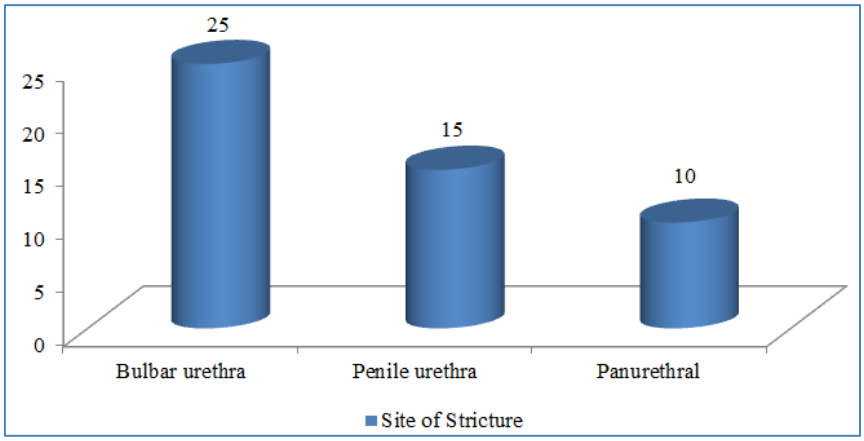

Fig-II: Site of stricture (N=50)

Uroflowmetry was done to evaluate peak flow of urine pre operatively and in each follow up. Pre-operative peak flow was 6.08 (±1.95) ml/sec. After substitution urethroplasty, peak flow increased 23.7(±1.11)ml/sec. in first month, which was significant. On subsequent follow ups, mean peak flow of urine was 29.31(±2.82)ml/sec. which was significant (Table III).

Table-III: Comparison between pre and post-operative peak flow of urine

Pre-operative peak flow rate	Post-operative peak flow rate		p-value
6.08±1.95	1st month	29.78±3.06	<0.001
	3rd month	30.02±3.13	<0.001
	6th month	29.06±2.80	<0.001
	9th month	28.60±2.40	<0.001
	12th month	29.04±2.77	<0.001
	24th month	29.84±3.02	<0.001

Paired t-test done. P-value <0.05 was significant.

Pre and post-operative PVR was assessed by USG in all patients. Here the mean PVR pre-operatively was 155.25±10.49 ml. After the operation, mean PVR was 18.35±8.56 ml in 1st month, 18.87±8.31 ml in 3rd, 19.06±7.86 ml on 6th, 18.64±5.30 ml on 9th, 21.04±6.78 ml on 12th & 20.83±7.35 ml on 24th month respectively, which were statistically significant. This showed improvement in patient complaint & a decline in disease progression. (Table V).

Table-V: Comparison of pre & post-operative mean PVR

Pre-operative mean PVR	Post-operative mean PVR		p-value
155.25±10.49	1st month	18.35±8.56	<0.001
	3rd month	18.87±8.31	<0.001
	6th month	19.06±7.86	<0.001
	9th month	18.64±5.30	<0.001
	12th month	21.04±6.78	<0.001
	24th month	20.83±7.35	<0.001

Paired t-test done. P-value <0.05 was significant.

The post-operative Complication rate is 12.5% (5/40).Of the 50 cases, 5 cases had complications (10%). There were no perioperative deaths. The most common type of complication was urinary tract infection which was treated with appropriate antibiotics according to culture and sensitivity. Bleeding per urethra occurred in 2 patients which required blood transfusion. Post-operative bleeding managed

conservatively by applying pressure bandage to perineum. One patient had small wound dehiscence which was repaired later by secondary suture. Out of 50 cases only one developed urethrocuteneous fistula. It was healed spontaneously within two weeks. Only one case had malfunction of foley catheter by small clot which was managed by irrigation. One patient developed recurrence of stricture and it was treated optical internal urethrotomy (Fig III).

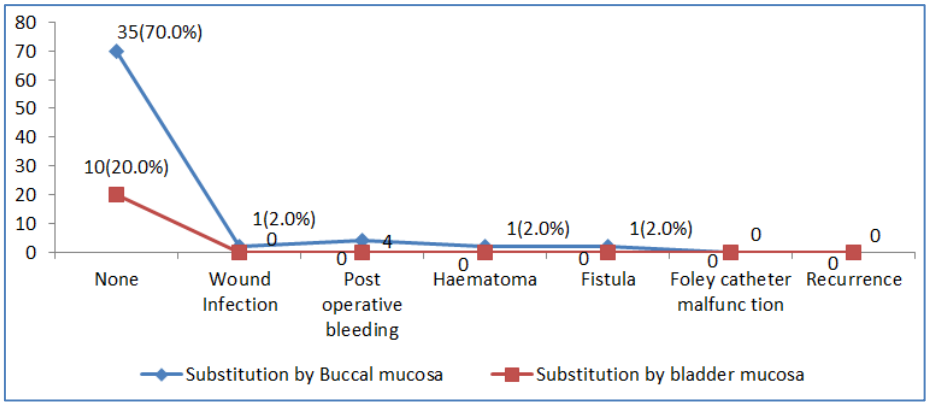

Fig-III: Post-Operative Complication

After six months of follow up only two patients complaints obstructive symptom. Uroflowmetry showed peak flow rate less than 10 ml. Here we did cystoscopic examination. And stricture segment was identified proximal to the previous site which was managed by OIU. After that no such obstructive flow was reported by those patients. Retrograde Urethrogram was done in all the patients to see caliber of urethra. In case two out of 50 showed recurrence in RGU with MCU.

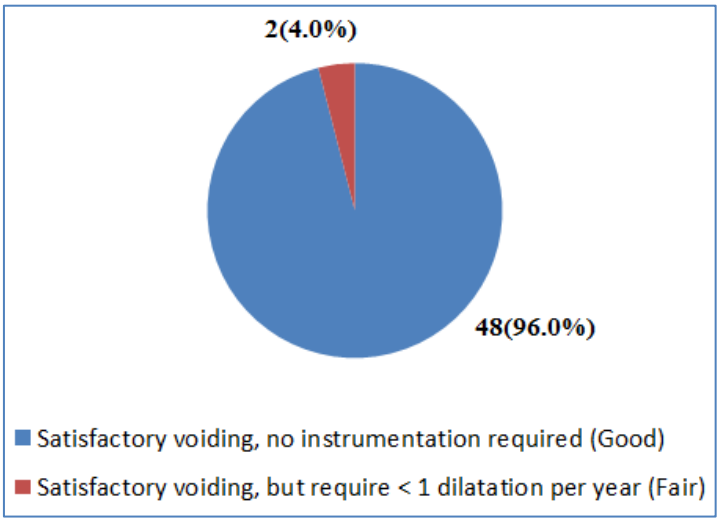

Fig-IV: Outcome of Urethroplasty after completion of 2 year follows up

DISCUSSION

This was a retrospective study which was carried out on 50 patients with long segment anterior urethral stricture who underwent substitution urethroplasty on Enam Medical College & Hospital during January 2018 to January 2021. Management of intractable anterior urethral strictures poses a continuing urological challenge. Regardless of the severity of the stricture, urologists strive to meet such demands. Substitution urethroplasty is the gold standard in the management of stricture urethra with very good outcome. This study was designed to assess demographic and aetiological factors for formation of urethral stricture in Bangladeshi perspective. It also shows the outcomes of substitution urethroplasty as well as occurrence of common complications. In this study 40 patients out of 50 have been treated with substitution urethroplasty by buccal mucosa and remaining 10 have been treated by bladder mucosa. The incidence of stricture disease in this study was between age ranges of 23 years to 48 years. Epidemiological studies by Murthy V. and Srimannasayana P. (20019) reported that any segment and urethral disease occurred in 19-62 years age group.

This study showed that inflammation is the most common cause of stricture urethra, followed by recurrent and traumatic. This is similar to that

epidemiological study carried out by Deber & Almas (2014). 25 cases were reported as inflammatory group as they had gonococcal or non-gonococcal urethritis with or without discharge. Strictures following instrumentation were also reported here. Almost all cases are covered in randomly selected series, as technique of management mostly focus on the study.

In this study all patients presented with poor flow during micturation with prolonged voiding time. VLN Murthy Bisapati [23], Suresh Bethu and other coauthor reported that 58 patients had severe poor flow. Lumen. N. Hocbue and Willenson Pet mentioned about interrupted flow and double stream during micturition. It was also notable in my study 8 patients had acute retention which required suprapubic diversion.

Ascending and descending urethrogram showed the exact site, length and nature of stricture segment. Different study noted that length of stricture segment varies from 1-10cm depending on site of stricture. In case of bulbar segment stricture segment varies from 1-5cm and incase of penile part, it was 5-10cm. My study showed same reflection as I mentioned in different literatures.

A study carried out by Chang YL, Toh KL [24] reported that patient with stricture urethral disease had significant and low peak flow rate on uroflometry. Another study by Meets JJ, Erickson MA [25] reported high PVR with poor peak flow rate. Mean value of peak flow rate as these studies varies from 5.05ml to 6.98ml. Our study showed mean value of peak flow was 6.08±1.95 ml. this value was almost similar to other value that was reported by other authors. Whereas immediate postoperative mean value of peak flow rate was 29.78 with standard deviation of 3.06. Uroflowmetry was performed 2 months, 6 months, 12 monthly, 18 monthly and 24 monthly and their P value was significant. Literature reviewed that preoperative mean value of peak flow rate on urethroplasty was 7.6ml/sec and postoperative it was raised upto 30 ml/sec. My study showed similar type of significant change of flow rate on uroflowmetry following surgical correction. Schedule that I had provided to patients for their follow up was almost similar to other study carried out by other urologists.

This study recorded pre- & post-operative PVR by USG for assessment. Here we saw the mean PVR pre-operatively was 155.25±10.4 ml which reduced to 18.35±8.56ml on 1st month & was 20.83±7.35ml on 24th month of follow-up. This was similar to study done previously.

It is confirmed that bladder mucosa has got a bit more propensity to shrink, so extra 10% of additional length is taken for grafting. But for buccal mucosa 1:1 length of graft is taken as it does not undergo significant shrinkage. Here mode of graft placement was also reported. But this technique was first described by Humhy in 1941. The author mentioned that only or patch grafts are outstanding application for buccal mucosa. On the contrary Marshal and Spillman [28] gave the idea of use of bladder mucosa as graft. They used bladder mucosa as a patch or tubercularized free graft for urethral reconstruction. Later, several author worked on it. As a result modifications have emerged to manage the long segment segment anterior urehtral stricture disease.

Deepak Dubey [29] and co-authors reported 92 patients who received BMG substitution urethroplasty in between January 1998 and October 2003. Some of them received graft dorsally and some received ventrally. Xu YM, Qia O [30] had experience of placing 65 buccal mucosa and 15 bladder mucosa. This study 40 patients received buccal mucosa graft and 10 patient had bladder mucosal graft replacement. Here flaps were placed both ventrally and dorsally. 20 cases having bulbar urethral disease received both buccal and bladder mucosa ventrally. Rest 5 of bulbar stricture, graft was placed dorsally. 15 patients of penile urethral disease, both buccal and bladder mucosal graft placed dorsally. However in 10 cases that had dual pathology i.e. involving both penile and bulbar part received buccal mucosal graft dorsally and ventrally respectively. For the placement of graft, this study followed other study. A study carried out by Deepak, Dubey [31] and his team reported that dorsal onlay free graft urethroplasty for bulbar urethral stricture disease provides excellent outcomes. This is also supported by several studies. Some literature argued that dorsal onlay is superior to ventral only for bulbar urethroplasty. Whereas others reported excellent long term outcomes with ventral onlay techniques. Ventral flap is technically easier to apply than dorsal only. Some study [32] reported complication of ventral graft replacement like pseudo diverticulum, post void dribbling and ejaculatory dysfunction. Here almost all graft placed ventrally on proximal and mid bulbar structure.

However none of above mentioned complication developed till now. Literature [33] revised diverticulum and fistula more common on ventral onlay than dorsal onlay but in this study no such case is reported. In this study it is shown that overall complications occurred in five cases (12.5%) those were treated by buccal mucosal graft and none those were treated by bladder mucosal graft. In the literatures similar [34] result of overall complication rate was 10-25% in buccal mucosal graft and 12-28% in bladder mucosal graft. In my study, no complication was found in bladder mucosal graft replacement. As number of patient receiving bladder mucosa was few so that is does not give the actual reflection of complication rate by bladder mucosal graft. Several study [35] demonstrated that complications following reconstructive surgery were minor and mostly infection related. Position related and bleeding complications

were relatively rare. Postoperative bleeding, haematoma, fistula and wound infection were reported in this study. Several study reported this type of complications following urethral reconstructive surgery. The complication that is mentioned in this study was minimal. Reconstructive urethral surgery has been shown to be an effective treatment for urethral stricture disease. This study showed very high positive outcome i.e. 96%. Outcome of urethroplasty were evaluate by patients satisfaction, uroflowmetry and sonography and in certain cases RGU with MCU. Rajkumar Mathur [36] and co-author reported outcome of 98 patients following surgical correction. Their study analyzed the outcome by preoperative and postoperative peak flow rate on uroflowmetry and RGU with MCU. They followed up those 98 pattern upto 3 years. Their study reflects the outcome in immediate postoperative period, 6 months, 1 year, 2nd year and 3rd years. That study demonstrated that results on immediate postoperative and after 6 months remain same i.e. 96.2%. However this decreases to 92% at 12months and 90% at 24 months. During this time they considered 19 patients as a failure of procedure and required repeat urethroplasty. Their study also demonstrates that most of the recurrence occurred within first 2 years of surgery and required intervention. In my study all the patients were followed upto 2 years. 48 patients showed no recurrence. But 2 patients developed restricture after six months of procedure. This data is similar to previously mentioned literature.

Jaccob M. Patterson, Chrustopher R. Chapple [37] performed an updated literature review. They commented that in experience hard outcomes of both dorsal onlay grafts and ventral onlay grafts in bulbar urethroplasty are similar. Barbaghi [38] treated 37 patients by dorsal onlay buccal mucosal bulbar urethroplasty on success rate was 92 % after 2 years of follow up. Dubay [39] reported 41 dorsal onlay graft/ urethroplasty with success rate of 90% after 36 months of follow up. Andraich [40] also reported 95% success rate on 42 patients after 48 months of follow up. Moreover other studies carried out by Morey [41] and colleagues showed 100% success rate on ventral on lay buccal mucosa graft urethroplasty after 18 months of follow up. Kane [42] using similar ventral on lay technique of graft urethroplasty and reported 94% success rate in 53 patients after completions of 25 months of follow up. So reviewed from different article it is proved that substitution urethroplasty is a versatile and effective treatment for strictures throughout the anterior urethra and on experienced hands outcomes are similarly favorable whether a dorsal or ventral approach is taken. In this study 50 patients received graft urethroplasty both ventrally and dorsally showed significant outcome i.e. 96% after the completion of 2 years of follow up period. This data is almost similar to other study.

CONCLUSION

This study represents the reconstruction of bulbar and penile urethral stricture disease with brilliant success. Different types of tissues are standardized by different surgeons. Each type of graft has its own procedural advantage and disadvantages. So it is recommended to select the case for particular type of graft. But judicious use of specific graft has almost equal outcome. This study showed better outcome than any other conventional method for the treatment of stricture urethral disease. So, it can be concluded that substitution urethroplasty is the treatment of choice for the management of long segment anterior urethral stricture.

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