



A Study of Single-Stage Repair of Anterior Urethral Strictures using Buccal Mucosal Grafts

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Abstract

Background: A urethral stricture is narrowing of the urethral lumen which is surrounded by corpus spongiosum. It is a common condition but can lead to serious complications such as urinary retention, infections and renal insufficiency. **Methods:** This prospective case-control study was conducted in the Department of Urology, Chalmida Anand Rao Institute of Medical Sciences, Bommakal, Karimnagar. Patients who underwent single-stage urethral repair using overlapping dorsal and ventral buccal mucosal grafts were included in the study. **Results:** Based on the inclusion criteria a total of n=20 patients were identified with complex anterior urethral strictures and included during the study period. The mean buccal mucosal graft width was 1.25 cms and no graft was wider than 1.5 cms. Dorsal grafts mean length was 1.9 cms applied in the cases where there is more severe stricture is present they were approximately 35% of the ventral graft length at the most. At a mean follow up of 12 months n=18 of total n=20 patients were voiding spontaneously without the need for any further procedures with a success rate of 90%. **Conclusion:** We in the present study conclude that a single-stage overlapping double buccal mucosal graft urethroplasty is very effective in the treatment of complex anterior urethral strictures. The success rates by this study and other studies in this field have shown that it may be preferred to staged urethroplasty. It was found that most of the cases were having a high postoperative Qmax hence able to return to normal baseline activities.

Keywords: anterior urethral strictures, buccal mucosal grafts, Single-stage repair

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Introduction

Urethral stricture is a heterogenous condition where there is a narrowing of the urethral lumen that is surrounded by corpus spongiosum urethral meatus through the bulbar urethra. Urethral stenosis is a narrowing of the posterior urethra through the bladder neck and prostate junction that is not enveloped by corpus spongiosum. It requires a variety of reconstructive techniques to achieve optimum outcomes. Most of the cases will be treated by excision and primary anastomosis or augmentation urethroplasty. [1-4] The repair of anterior urethral strictures involves augmentation urethroplasty to create sufficient

urethral lumen. Among the various skin flaps used buccal mucosa graft is also commonly used which will be sutured to urethral mucosa to enlarge the narrow urethral channel. But in cases of severe urethral strictures, the urethral mucosa and corpus spongiosum could be heavily affected and complete obliteration of urethral lumen may develop. Many such patients are of failed hypospadias repairs or severe urethral strictures. In patients where urethral mucosa of the affected segment cannot be used for restoration, a complete reconstruction of the whole urethral circumference is required. [5, 6] We in the present study tried to evaluate the results of single state reconstruction of complex focally severe strictures by using a short, dorsal

buccal mucosal graft placed in the most severely affected portion of stricture and longer overlapping onlay of ventral buccal mucosal graft spanning the entire stricture length.

Materials and Methods

This prospective case-control study was conducted in the Department of Urology, Chalmida Anand Rao Institute of Medical Sciences, Bommakal, Karimnagar. Institutional Ethical committee permission was obtained for the procedure. Written consent was obtained from the parents of the patients involved in the study after explaining the nature of procedures performed and expected outcomes in the local language. Patients who underwent single-stage urethral repair using overlapping dorsal and ventral buccal mucosal grafts were included in the study. The patients were evaluated by recording the complete history, physical examination, non-invasive uroflowmetry. Stricture anatomy was analyzed using retrograde and voiding cystourethrography and flexible cystoscopy was used in some cases. Urethral catheter if the present was removed about one and a half months before allowing for maturation and this enables the intraoperative identification of the diseased segment. Suprapubic cystotomy tubes were placed preoperatively for men with urinary retention. For the operation, the patients were positioned depending on the site of stricture for pendulous strictures the dorsal lithotomy position was adopted and for bulbar strictures and supine position for pendulous strictures. A standard technique of harvesting of the buccal mucosal graft was used. [7, 8] A midline incision was done to exposure urethra. A ventral stricturotomy was performed beginning at the distal end of the stricture identified by a flexible cystoscope and opened proximally until normal caliber urethra is obtained. The tissue quality of the urethral plate was examined and the length and width of the stricture were determined. Severe spongiofibrosis and obliterative urethral plate segments of less than 5mm wide the urethral plate and the underlying fibrotic corpus spongiosum were focally transacted and removed. The urethral plate was mobilized and reconstructed using appropriately tailored dorsal graft to fill the defect and fixed to corporal bodies using interrupted 5-0 PDS sutures.

Urethral plate segments of 5 – 10mm wide and healthy corpus spongiosum were incised in the dorsal midline to the level of tunica albuginea and lateralized with elliptical graft fixed up to the medial edges of the urethral plate with interrupted 5 – 0 PDS sutures. The reconstructed plate was then augmented with appropriately tailored ventral graft secured across the entire length of stricurotomy with running 5 – 0 PDS over 16 F silastic catheters. The wound was closed in three layers and no drains were placed. Voiding cystourethrogram was performed after 3 – 4 weeks to confirm the patency and integrity of the repair. The follow up was at 3 – 6 months intervals. Urethrography and urethroscopy were used for men with obstructive voiding symptoms or when the max urinary flow rate was <15ml/sec.

Results

Based on the inclusion criteria a total of n=20 patients were identified with complex anterior urethral strictures and included during the study period. The minimum age of the patient included 27 years and the maximum age was 49 years the mean age was 41.5 years \pm 10.5 years (table 1). The mean stricture length was 4.1 cms. The mean buccal mucosal graft width was 1.25 cms and no graft was wider than 1.5 cms. Dorsal grafts mean length was 1.9 cms applied in the cases where there is more severe stricture is present they were approximately 35% of the ventral graft length at the most. The mean length of the ventral graft was greater since it was applied to the entire length of the stricture (table 6). At a mean follow up of 12 months n=18 of total n=20 patients were voiding spontaneously without the need for any further procedures with a success rate of 90%. The mean values of Q max in this group were 21.9 ml/sec. N=2 patients out of n=18 patients had Q max values of <15ml/sec but cystoscopy and urethrography showed no evidence of re-stenosis. The recurrence of strictures was found in n=2 patients with a mean period of 12 months postoperatively they underwent revision urethroplasty with excision and primary anastomosis. The cases were successfully managed.

Table 1: Demographic profile of the patients

Age Groups	Frequency	Percentage
21 – 25	0	0
26 – 30	1	5
31 – 35	2	10
36 – 40	5	25
41 – 45	7	35
46 – 50	5	25
Total	20	100

Table 2: Etiology of stricture in the patients

Stricture Etiology	Frequency	Percentage
Idiopathic	9	35
Iatrogenic	2	10
Lichen sclerosis	1	05
Trauma	6	30
Hypospadias	2	10
Total	20	100

Table 3: Stricture location of the patients

Stricture location	Frequency	Percentage
Bulbar	13	65
Pendulous	6	30
Panurethral	1	05
Total	20	100

Table 4: Previous treatments in the patients

Previous treatments	Frequency	Percentage
Urethroplasty	3	15
Urethrotomy/dilatation	17	85
Total	20	100

Table 5: Stricture length in centimeters

Stricture length in cms	Frequency	Percentage
2.0 – 3.5	5	25
3.6 – 4.0	4	20
4.1 – 6.0	2	10
6.1 – 7.9	7	35
> 8	2	10
Total	20	100

Table 6: Type of grafts used in the study

Type of graft	Frequency	Mean length (cm)	Mean width (cm)
Ventral graft	20	5.1	1.5
Dorsal grafts			
Plate incision	9	1.5	0.8
Plate excision	9	1.9	1.1
Both plate incision & excision	2	2.5	1.0

Discussion

All the aspects of urethral strictures must be precisely defined to plan a correct approach which is likely to give successful results. Complex urethral strictures in men often have obliterative segments which are manifested as a narrow or unusable urethral plate at the time of the only urethroplasty. The urethral plate salvage with a combination of tissue transfer is the approach that has been shown to deliver promising results in complex urethral constructions. [9, 10] When penile and bulbar urethral strictures with salvageable urethral mucosa and relatively healthy spongy tissue could be successfully repaired using either buccal mucosa graft or penile skin flap. In case of complex non-obliterative urethral strictures often require a staged approach. [11 - 14] In the current study the decision of operation was based on the width of the urethral plate at the most severe segment of stricture. The intermediate segments with a width of 5 – 10 mm were incised and lateralized, then reconstituted with a diamond-shaped dorsal graft. The narrower segments with a width less than 5mm were considered unusable and therefore excised and completely replaced with a rectangular dorsal graft. In both, cases the longer ventral graft was placed spanning the entire length of stricture and anastomosed to either lateralized urethral plate or dorsal graft. Morey AF [15] in 2001 used a single-stage overlapping penile skin graft and buccal mucosal graft urethroplasty for the reconstruction of complex pendulous urethral strictures. We in this study used the same method with overlapping grafts used by Morey AF [15]. Erickson BA et al; [10] worked with a similar technique and found a success rate of 78% in 14 patients with a median follow up of 2.5 years. We in the present study found a success rate of 90% with a mean period of follow up of 12 months. Steven J et al; [16] found a success rate of 89% with a mean follow up of 15.7 months. Palminteri et al; [9] used an overlapping buccal mucosal graft for reconstruction of bulbar strictures. At the mean follow up of 22 months they found 89.6% success in n=48 patients. The complex obliterative urethral strictures present with a total loss of viable urethral mucosa in the

affected segment that is followed by spongiofibrosis. In such cases, reconstruction of the whole urethral circumference is required. Excision of obliterated segment and end to end urethral anastomosis is the option for only short strictures which are located in the bulbar urethra. Anastomotic repairs of the penile urethra are not recommended owing to higher rates of failure and subsequent chances of penile curvature. A complete circumferential urethral segment needs to be created if complete obliteration of anterior urethra is present. Single-stage repair in these cases of strictures higher failure rates if tube flap or grafts are used [5, 6, 11]. The first overlapping BMG for the reconstruction of pendulous strictures was done by Steven J et al; [16] we in the current used the same technique they have described the advantage of double overlapping BMG as compared with single wide Onlay graft or tabularized graft is the ability to have a graft supported by its independent vascular bed. The dorsally placed grafts are supported by surface corpora cavernosa at all levels of anterior strictures [17]. The support the ventral graft is dependent on stricture location and in the bulbar urethra the abundant ventral sponge support for the graft exists [2]. The disadvantage of the multistage urethroplasty for complex urethral strictures which is widely used for complex strictures is marked by extended bed rest, bulky dressings after first stage longer interval between stages and graft maturation leading to cosmetic, sexual and voiding problems. Many patients hence prefer the single stage.

Conclusion

We in the present study conclude that a single-stage overlapping double buccal mucosal graft urethroplasty is very effective in the treatment of complex anterior urethral strictures. The success rates by this study and other studies in this field have shown that it may be preferred to staged urethroplasty. It was found that most of the cases were having a high postoperative Qmax hence able to return to normal baseline activities.

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