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Original Article

Urology Section

Dorsal Onlay Buccal Mucosal Graft Urethroplasty for Long Segment Anterior Urethral Strictures: A Retrospective Study of Mid and Long-term Outcomes

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ABSTRACT

Introduction: Dorsal onlay urethroplasty with Buccal Mucosal Graft (BMG) is the single stage procedure and is most commonly used to treat long segment anterior urethral strictures. Unilateral mobilisation of the urethra prevents both chordee and ischaemia.

Aim: To evaluate the feasibility, medium-term and long-term outcomes of dorsal onlay BMGs when used to treat long anterior segment penile urethral stricture with unilateral mobilisation of the urethra.

Materials and Methods: A retrospective study was conducted in Kasturba Hospital, Manipal, Karnataka, India, from January 2008-December 2018. A total of 56 patients with long anterior segment penile urethral strictures underwent BMG substitution for urethroplasty, with a follow-up period ranging from 1.2-10 years. The outcome of the procedure was assessed through clinical history and physical examination, uroflowmetry, retrograde and voiding cystourethrography and urethroscopy {6 French gauge (Fr)}. Statistical analysis was performed using the mean and median.

Results: The mean age of 56 patients was 51.8±9.9 years, with a mean±Standard Deviation (SD) Maximum Flow Rate (MFR) of 20.1±5.3 mL at one month and 18.1±4.3 mL at three and 18.7±3.7 mL six months, 17.3±5.1 mL, 19.3±4.3 mL and 18.6±3.7 mL at one year, 2-5 years and 10 years postoperative respectively. Postvoid Residual urine (PVR) volume was higher till one year follow-up (i.e., first month it was 38.6±23.6 mL in 47 patients, third month it was 45.8±22.4 mL in 12 patients, sixth month it was 49.0±28.8 mL in 14 patients and one year follow-up it was 43.9±30.8 mL in 24 patients). Minimal complications were noted over 5-10 years follow-up.

Conclusion: For long segment anterior penile urethral strictures, unilateral mobilisation in BMG urethroplasty had shown success over both medium and long-term periods.

Keywords: Buccal graft, Dilation, Postvoid residual urine, Substitution urethroplasty, Urethrotomy

INTRODUCTION

Endoscopic treatment modalities such as dilatation and urethrotomy for urethral strictures are widely preferred by patients worldwide. But, the recurrence of stricture and repeat Direct Vision Internal Urethrotomy (DVIUs) and/or dilatation reduce the efficacy of subsequent urethroplasty [1]. Excision and primary anastomosis, as well as graft onlay urethroplasty, are the most commonly used urethroplasty techniques. The rate of sexual complications after anastomotic urethroplasty is reported to be higher than that for a cohort of buccal graft urethroplasty patients, in spite of having much longer stricture [2]. The high rates of success, especially urethroplasty using a BMG has become the primary surgical treatment for long segment bulbar urethral strictures that are not suitable for anastomotic urethroplasty [3].

Stricture aetiology, length, location and degree of spongiofibrosis are the decisive factors for urologists to choose the treatment modality. The dorsal graft onlay urethroplasty is versatile and allows for the treatment of increasingly long strictures, including pan-urethral strictures. A unilateral urethral mobilisation preserves its neurovascular supply. A buccal graft can be used to treat strictures of upto 7 cm in length. In cases of longer strictures (6-8 cm), double buccal graft urethroplasty reduces the failure rate of BMGs [4]. Dorsal onlay buccal urethroplasty with penile inversion through a perineal incision has been refined by using a unilateral mobilisation to preserve urethral blood supply [5]. The present study evaluated the long-term outcome of the same technique for a mean follow-up period of 10 years. The present study, having a decade long follow-up of dorsal onlay BMG urethroplasties for long segment anterior urethral strictures, is an effort not only to contribute to the previous paucity of data in this regard, but also to demonstrate that the procedure has very well stood the test of time.

MATERIALS AND METHODS

A retrospective descriptive analysis was performed on a cohort of 56 patients with long segment anterior urethral stricture with BMG substitution urethroplasty at Kasturba Hospital, Manipal, Karnataka, India from 1st January 2008-31st December 2018 and data analysis was performed in February 2021.

Inclusion criteria: Patients with long, non obliterated anterior urethral strictures (>8 cm) of penile and peno-bulbar urethra were included in the study.

Exclusion criteria: Patients with obliterative strictures (<6 Fr urethral lumen), recurrent strictures, radiations and a history of previous urethroplasty were excluded.

The surgery was a single stage dorsal onlay with unilateral mobilisation of urethra. The medium and long-term outcome was ascertained for follow-up from 1.2-10 years. The follow-up time was calculated for each patient based on time from surgery up to last follow-up date at the hospital. The primary outcome of the study was to establish the efficacy of medium and long-term outcomes of dorsal onlay oral mucosal graft to treat long anterior segment urethral stricture with unilateral mobilisation of urethra through follow-up studies.

Preoperative data included age at surgery, clinical history, physical examination, uroflowmetry, retrograde and voiding cystourethrography. The stricture site and length were assessed through urethroscopy (6 Fr).

STATISTICAL ANALYSIS

Data was entered into MS excel and statistical analysis was done using Statistical Package for the Social Sciences (SPSS) 23.0. The data were represented using the arithmetic mean, SD for continuous variables and in frequencies and percentages for categorical variables.

RESULTS

This study included 56 patients ranging in age from 36-76 years, with a mean age of 51.8±9.9 years. All the patients had Lower Urinary Tract Symptoms (LUTS) and underwent urethroplasty. Majority of patients, 36 (64.3%), had a peno-bulbar stricture, while the remaining 20 (35.7%) had a penile stricture. The cause of strictures was Balanitis Xerotica Obliterans (BXO) in 50% of the cases [Table/Fig-1].

Variables	Frequency (%)
Length of stricture Mean±SD (cm)	10.9±2.9
Suprapubic catheter (SPC) in-situ	6 (10.7)
Meatal involvement	26 (46.4)
Circumcision	16 (28.6)
Stricture site	
Peno-bulbar	36 (64.3)
Penile stricture	20 (35.7)
Causes of stricture	
Balanitis Xerotica Obliterans (BXO)	28 (50)
Idiopathic	23 (41.1)
Instrumentation	5 (8.9)

[Table/Fig-1]: Demographic, clinical and microbiological parameters of studied subjects.

The MFR of urine in 56 patients was found to be 20.1±5.3 mL at one month, slightly lower at three month (18.1±4.3 mL). A reduction in flow rate was observed during the follow-up period of upto one year, 2-5 years, and upto 10 years, with 17.3±5.1 mL, 19.3±4.3 mL, and 18.6±3.7 mL, respectively. After the first-year follow-up, the number of patients decreased to 25, then to 23 during the next 2-5 years and finally to eight between the 5-10 years.

Similarly, PVR urine volume was higher till one year follow-up (i.e., one month it was 38.6±23.6 mL in 47 patients, three month it was 45.8±22.4 mL in 12 patients, six month it was 49.0±28.8 mL in 14 patients and one year follow-up it was 43.9±30.8 mL in 24 patients [Table/Fig-2].

There were no perioperative complications or immediate postoperative complications. At one year follow-up, two patients had proximal graft site narrowing, three patients had chordee, three patients had postvoid dribbling and one patient had meatal stenosis. A follow-up at 5-10 years revealed that only one patient had postvoid dribbling of urine [Table/Fig-2].

Duration	MFR (number of patients)	PVR (n)	Complications (n)
1-month	20.1±5.3 (56)	38.6±23.6 (47)	NIL
3-month	18.1±4.3 (56)	45.8±22.4 (12)	1-Meatal stenosis, 1-Narrowing at proximal graft site
6-month	18.7±3.7 (56)	49.0±28.8 (14)	1-Meatal stenosis
1-year	17.3±5.1 (25)	43.9±30.8 (24)	2-Narrowing at proximal graft site, 2-Chordee, 3-Postvoid dribbling, 1-Meatal stenosis
2-5 years	19.3±4.3 (23)	30.9±16.8 (21)	3-Chordee, 1-Postvoid dribble 1-Long anterior urethral stricture
5-10 years	18.6±3.7 (8)	31.8±16.7 (8)	1-Postvoid dribble

[Table/Fig-2]: Postoperative follow-up measurements.

DISCUSSION

Substitution urethroplasty is the procedure of choice for a long stricture in the peno-bulbar urethra or a stricture of any length located anywhere from the distal bulbar urethra to the penile urethra using oral mucosal graft instead of penile skin and it has emerged as gold standard in anterior urethral stricture management [6]. Dorsal onlay buccal urethroplasty with unilateral urethral dissection and penile inversion through a perineal incision, a one-stage repair using a unilateral mobilisation would naturally have less morbidity, high success rate and neurovascular supply preservation there by reduced postoperative sexual complications as outcome [5].

The deterioration rate in anterior one-stage substitution urethroplasty appears to occur within the first five years [7,8]. There are only very few published data that revealed long-term results of oral mucosa substitution success rate with more than 7-10 years follow-up in a large series of patients [Table/Fig-3] [9-11]. When the re-stricture rate was compared at 5-10 years, it showed that with all types of urethroplasty there was a steady annual re-stricture rate of about 5% [3]. Hence, this study had high relevance as the mean follow-up period of the outcome study was 10 years. This procedure has less morbidity and was cost-effective as it is done in a single stage with perineal incision. Formation of penile scar was avoided. Neurovascular injury is minimal and hypospadias meatus was rarely seen. Proximal vascular supply to bulbar urethra and innervation of bulbospongiosus muscle was preserved which reduces the secondary outcomes of the surgery such as sexual complications [2]. The fact that, the outcomes after patch grafts are much better than tube grafts, is well established, however the techniques of graft procurement and its placing at recipient site coupled with the blood supply of the recipient area and the graft support are pivotal in the graft take-up and subsequent loosening of graft [12-15]. Long-term follow-up and multi-dimensional evaluation of success rate of urethroplasty are the strengths of the present study. Future prospects of area of research are tissue-engineered buccal mucosa to produce grafting material for urethroplasty which would bring down the morbidity due to harvesting of the graft tissue, or experimental strategies to prevent scar formation.

Parameters	Present study	Aldaqadossi HA et al., [9]	Spilotros M et al., [10]	Kumar S et al., [11]
Number of urethroplasty performed	56	34	128	40
Mean age (Years) (Range)	51.8 (36-76)	46.5 (39-52)	42.8 (16-74)	35 (15-65)
Stricture site				
Bulbar	36	0	66	0
Penile/Penobulbar	20	34	62	40
Follow-up (Range)	5-10 y	64-70 m	3-159 m	18-72 m
Re-stricture rate	5%	Not reported	19%	25%

[Table/Fig-3]: Urethroplasty outcomes comparisons amongst studies with long term follow-up [9-11].
m: Months; y: Years

Limitation(s)

The retrospective nature of the study, relatively small cohort and lack of sexual function and Quality of Life (QoL) data are some of the shortcomings.

CONCLUSION(S)

Unilateral urethral mobilisation in dorsal onlay oral mucosal graft urethroplasty for long segment anterior urethral strictures has good success rate in medium and long term as evidenced by the study.

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