

OUTCOME OF BUCCAL MUCOSAL GRAFT URETHROPLASTY IN LONG SEGMENT ANTERIOR URETHRAL STRICTURE

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Abstract:

Objective: To assess the success of BMG urethroplasty in long segment anterior urethral stricture.

Method: From January 2014 to December 2015, twenty male patients with long anterior segment urethral stricture were managed by BMG urethroplasty. After voiding trial they were followed up at 3 month with Uroflowmetry, RGU & MCU and PVR measurement by USG. Patients were further followed up with Uroflowmetry and PVR at 6 months interval. Successful outcome was defined as normal voiding with a maximum flow rate >15ml /sec and PVR<50 ml with consideration of maximum one attempt of OIU after catheter removal.

Results: Mean stricture length was 5.2 cm (range 3-9 cm) and mean follow-up was 15.55 months (range 6-23 months). Only two patients developed stricture at proximal anastomotic site during follow-up. One of them voided normally after single attempt of OIU. Other one required second attempt of OIU and was considered as failure (5%).

Conclusion: BMG urethroplasty is a simple technique with good surgical outcome.

Key words: Buccal mucosal graft urethroplasty, Uroflowmetry, PVR

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Introduction

Long-segment anterior urethral stricture management remains a challenge in reconstructive urology. Day by day different methods and techniques are coming in the field of management of stricture and some of them have been considered better. The surgical treatment of urethral strictures varies according to etiology, location, length, density of the lesion and fibrosis involving surrounding tissue[1,2,3].

Although much has been written on the various techniques used to reconstruct the urethra, there is little evidence comparing the outcomes of the different approaches. There is also no clear data to establish which type of urethroplasty is to perform under which particular condition, with the exception of open perineal

end to end anastomosis for the treatment of short segment bulbar strictures[4,5].

Open urethroplasty has become the gold standard for definitive treatment of urethral strictures⁶. It demonstrates high success rate (up to 95%) compared to alternative treatments such as direct visual internal urethrotomy (DVIU) and dilatation, both of which show long term recurrence rates of over 50%[7]. Many urological surgeons still believe reconstructive urethral surgery should only be offered as a last resort[8,9].

Patients with long segment strictures (>2 cm) are not suitable for end to end anastomotic urethroplasty due to the risk of post-operative chordee formation[10]. Substitution urethroplasty is ideal for the management of long anterior urethral strictures. The ideal material for substitution urethroplasty remains controversial¹¹. Urethra is the best substitute for urethra – Turner Warwick's opinion is still true¹⁰. So use of other

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substitute for urethra always has a compromised outcome state. Urethral substitution has long been accomplished by using genital skin flaps, grafts of genital or extra-genital tissues. However, use of genital skin pedicle flap is a difficult procedure requiring extensive penile and scrotal dissection to mobilize the flap to the deep perineum and associated with post-operative torsion and penile scarring[12,13]. Except these, post auricular full thickness free grafts, bladder mucosa, full thickness hairless abdominal wall skin, have been used as alternative free graft sources, the overwhelming majority of cases are most easily treated with buccal mucosal grafts[14].

Buccal mucosa has recently gained its popularity as a substitute for urethral reconstruction for both stricture and complex hypospadias[15,16]. It can be accustomed to a wet environment, having good vascularity, hairless, easy to harvest, thick epithelium making it easy to handle and less chance of graft contracture, having a thin lamina propria allowing easy inosculation, and reduced chance of pseudo-diverticula formation[11].

In our study, we described our initial experience in long segment anterior urethral stricture management using buccal mucosal graft (BMG) urethroplasty. Here unilateral mobilization of urethra (Left) and dorsolateral graft placement technique was adapted.

Materials and Method:

From January 2014 to December 2015, twenty patients with long segment anterior urethral strictures were managed by single stage BMG urethroplasty. Each patient was evaluated with detailed case history, physical examination, imaging study with retrograde urethrogram (RGU) and micturating cystourethrogram (MCU), uroflowmetry, USG of KUB region with PVR measurement, and other routine investigations required for anesthetic fitness. Of the strictures 11 were associated with Lichen sclerosus (BXO), 4 were traumatic, 2 were infective, and 3 were idiopathic in origin (Table I). Mean stricture length as measured by preoperative RGU and MCU was 5.2 cm (range 3-9 cm)(Table III). The sites of strictures were pan urethral in 4 patients, penile in 7 patients and bulbar in 9 patients (Table II).

Operation was performed under regional anesthesia (SAB) and the patient put in exaggerated lithotomy position. Operation was done in a 2- team approach – one team engaged in urethral procedure and other team in harvesting the buccal mucosa. Through a midline

perineal incision, the bulbospongiosus muscle was divided, exposing the corpus spongiosum of the anterior urethra. Then unilateral (left) mobilization of the corpus spongiosum up to the line just beyond the dorsal midline was done by invaginating the penis into perineal wound. Next, the strictured segment of the urethra was identified and evaluated the length. The other team then harvested the buccal mucosal graft of adequate length from the inner cheek area, below the Stensen's duct without injuring it.

Then the dissected urethra was rotated and dorsolateral surface was exposed. Next, the strictured segment was opened vertically through the dorsal midline extending the incision for about 1 cm both proximally and distally into the normal urethral lumen. Then the graft was placed on the corpus cavernosum dorsolaterally according to the length and position of the strictured segment and quilted over the corpora cavernosum using few 5/0 polyglactine quilting sutures for reinforcement with good support and minimizing the dead space. Next, the right margin of the graft sutured with the corresponding margin of the splitted urethra and a 16 Fr pure silicone Foley's catheter was inserted through the urethra into the urinary bladder. Then invaginated penis was repositioned and perineal wound was closed layer by layer. At the end of the procedure suprapubic catheter was placed in every case.

After 3 weeks of operation, per urethral catheter was removed and a voiding trial was done then retrograde contrast study was performed. If patient could successfully voiding, and no extravasation of contrast then suprapubic catheter was removed after 3-5 days.

At 3 months after catheter removal- uroflowmetry, RGU and PVR measurement by USG were performed. Patients were further followed up with uroflowmetry and PVR measurement at 6 months interval. A successful outcome was defined as normal voiding with the need for maximum one attempt of subsequent OIU.

Result:

A total 20 patients (mean age—35 years, range—20 to 60 years) underwent BMG urethroplasty through unilateral (Lt.) urethral mobilization and dorsolateral onlay graft placement technique between January 2014 to December 2015. Mean operating time was 117 minutes (range—90 to 150 minutes) and mean follow up period was 15.55 months (range-6 to 23 months). Only 3 patients required post-operative 1 unit blood transfusion. Mean duration of hospital stay was 6.7 days (range—5

to 10 days). One patient showed extravasation of contrast on RGU after 3 weeks of operation at proximal anastomotic site and successfully managed by extended suprapubic catheterization for another 2 weeks. Two patients developed stricture at proximal anastomotic sites and 1 of them voided normally after single attempt of OIU. But other required second attempt of OIU and then voided normally. The last one was considered as failure (5%). Three patients developed wound infection managed successfully with change in antibiotic according to the wound swab culture sensitivity test. No patient developed diverticulum, fistula, sacculation or protrusion of the graft at external meatus. Peak urinary flow rate improved from a mean of 7.35 ml/sec (range-4 to 12 ml/sec) preoperatively to 24.15 ml/sec (range-16 to 30 ml/sec) after 3 months postoperatively (Table IV).

Table-I
Aetiology of strictures:

Cause of strictures	No of patients
BXO	11
Traumatic	04
Infective	02
Idiopathic	03
Total	20

Table-II
Location(site of strictures):

Location of strictures	No of patients
Panurethral	04
Penile	07
Bulbar	09
Total	20

Table-III
Length of strictures:

Length of strictures	No of patients	Mean Length
2-4 cm	8	
5-7 cm	8	5.2 cm
8-10 cm	4	

PVR on USG decreased from a mean of 145.95 ml (range—60 to 300 ml) preoperatively to a mean of 18.5 ml (range—8 to 40 ml) after 3 months postoperatively (Table IV). In our series, minimum follow up was 6 months and maximum follow up was 23 months from the date of catheter removal.



Fig.-1: Long segment anterior urethral stricture

Table-IV
Improvement in Q-max and PVR score after operation:

Assessment Criteria	Preoperative	Postoperative (After 3 months)	p Value
Mean Q-max (range)	7.35ml/sec(4-12)	24.15 ml/sec(16-30)	<0.00001
Mean PVR (range)	145.95ml(60-300)	18.5ml(8-40)	<0.00001

Discussion:

Long anterior urethral stricture (>2cm) should be treated with substitution urethroplasty to avoid post-operative chordee formation[10]. Substitution urethroplasty may be a patch graft or tube graft[17,18,19,20].

Humby was the first to use buccal mucosal graft for urethral reconstruction in a series of single stage hypospadias repair[21]. However, BMG urethroplasty has emerged as a popular technique in 1990s. But whether to place the graft dorsally, ventrally, or laterally is still controversial. Ventral onlay graft is more prone to fistula formation, sacculation and diverticula formation leading to urinary stasis and ejaculatory dysfunction[11]. On the other hand, dorsal onlay graft provides the advantage of better mechanical support by the corporal bodies for the graft's better take up and less incidence of sacculation & fistula formation[22,23].

In different series, ventral onlay urethroplasty has revealed a success rate of 57.1% to 100% with a follow up ranging from 20 to 64 months[24,25]. On the other hand, dorsal onlay BMG urethroplasty has shown a success rate from 85.5% to 100% with a follow up ranging from 22 to 41 months[24,25].

Recently, Barbagli et al. Published retrospective study of 50 cases with bulbar urethral stricture where buccal mucosal graft urethroplasty were done. In their study, grafts were placed as ventral, dorsal and lateral onlay in 17, 27 and 6 patients respectively. After a mean follow up of 42 months, placement of graft into ventral, dorsal and lateral surface of the bulbar urethra showed the similar success rates[26].

Circumferential mobilization of the urethra, as suggested in the original dorsal onlay graft technique causes damage the vascular connections between the corpus spongiosus and the tunica albuginea and the lateral vascular connection between the urethra and the superficial perineal tissue on both sides[27,28,29]. On the other hand, unilateral mobilization is a minimally invasive approach where there is a preservation of the one-sided vascular supply to the urethra and its entire muscular and neurogenic support represents a slight but significant step toward perfecting the surgical technique of urethral reconstruction[30].

In our series of 20 cases, only two patients developed stricture at proximal anastomotic sites and one of them voided normally after single attempt of OIU and other patient required 2 attempt of OIU and considered as failure case i.e. 5% failure. No one developed

diverticulum, sacculation, or fistula. Maximum urinary flow rate improved from a mean of 7.35 ml/sec to 24.15 ml/sec and post voidal residual urine reduced from a mean of 145.95 ml to a mean of 18.5 ml.

So, there was an inverse relationship between peak urinary flow rate and post voidal residual urine and there was a statistically significant improvement of peak urinary flow rate before and after operation. The success rate was similar to the universe (95%).

Conclusion:

In our study, it has been shown that dorsolateral BMG urethroplasty through unilateral urethral mobilization is a reliable and satisfactory procedure to manage long anterior urethral strictures with minimum complications. Harvesting the graft is simple, only requiring good coordination between two teams of surgeons. Few cases, considered as failure with stricture formation can be managed with OIU. Our follow-up is considerable but not long term. So, further long term follow-up should be continued to confirm the durability of the results. The question of placing the BMG dorsally, ventrally or laterally is still unresolved. A randomized controlled trial with careful patient selection and long-term evaluation of results is required to solve this controversial issue.

Conflict of Interest : None

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